THE SPACE SHUTTLE PROGRAM IN TRANSITION: KEEPING SAFETY PARAMOUNT, PART II

HEARING

BEFORE THE

SUBCOMMITTEE ON SPACE AND AERONAUTICS

OF THE

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

NOVEMBER 9, 1995

[No. 27]

Printed for the use of the Committee on Science

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THE SPACE SHUTTLE PROGRAM IN TRANSITION: KEEPING SAFETY PARAMOUNT, PART II

THURSDAY, NOVEMBER 9, 1995

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
SUBCOMMITTEE ON SPACE AND AERONAUTICS,
Washington, DC.

The subcommittee met at 10 a.m. in Room 2325 of the Rayburn House Office Building, the Honorable F. James Sensenbrenner, chairman of the subcommittee, presiding.

Mr. SENSENBRENNER. The subcommittee will be in order.

Good morning, ladies and gentlemen. A short 43 days ago we met to discuss Shuttle safety. We heard many things that were encouraging and many things that were not.

Unfortunately for NASA, we heard nothing. That silence was ominous and more than a little disconcerting since we know Dr. Littles to be a thoughtful and thorough person.

Fortunately, I see from Dr. Littles prepared statement that he is back in form and brimming with details that will enable the Committee to conduct its oversight role.

Oddly enough, I am still a little worried. In six short weeks, NASA moved from vague notions of preserving safety to this very extensive testimony on maintaining safety in the context of contract consolidation and budget savings.

But that is not what disturbs me.

We heard from the Kraft Report last spring that contract consolidation could increase safety and reduce costs. I am still concerned for different reasons.

Two days ago Mr. Goldin gave Members of this Committee three hours' notice that he was sending a letter to the Speaker of the House and the President of the Senate. That letter, which he would not share with legislators responsible for oversight—specifically Mr. Walker, Mr. Brown, and myself—essentially said that NASA did not intend to continue with the full and open competition to operate the Space Shuttle under a single prime contract.

Instead, NASA decided to consolidate the Shuttle and station operations' contracts in a noncompetitive procurement. In short, NASA will accelerate the process of consolidation and ask Shuttle operators to run the Space Station as well, which goes beyond what has been discussed in the past.

It appears that NASA has suddenly achieved full confidence that Shuttle safety is maintained under a very major program overhaul,

despite its inability to describe the process in any detail at our last hearing.

It may be in the national interest to implement such measures; I do not know yet because NASA did not give this Committee the opportunity to understand the process before announcing its decision.

Apparently the window of opportunity for Congress to inquire about such a radical departure from previous plans and to receive a responsive answer from NASA is about as narrow as the Space Shuttle's five-minute launch window to reach the Russian Space Station MIR.

When Atlantis launches on Saturday to rendezvous with MIR, its launch window is dictated by physics. Perhaps NASA exists in a parallel universe in which the laws of time and space limit the ability to discuss vital issues with members of Congress to that narrow window of opportunity a few hours before the agency issues a press release.

Since members of this Committee would be willing to meet with NASA representatives on very short notice over such monumental changes in both our Shuttle and Station programs, we can only conclude that this Committee's narrow window of opportunity to learn about NASA's latest decision on the Shuttle and the Station has been deliberately dictated by NASA, and that bothers me.

Yesterday Dr. Littles went on NASA television and spoke about the need to bring Congress up to speed on this issue, and to reduce our alleged ignorance of what NASA hopes to achieve with this change.

I agree. In fact, members of this Committee have moved mountains to drag information out of NASA, but the Agency has not been very forthcoming. That is why we decided to have this second hearing so that NASA could provide that information now that it failed to do six weeks ago.

I would remind the Agency that Congress is not an afterthought. I also cannot help but wonder whether NASA's decision was either rushed, or why questions asked by Congress on behalf of the American public were not answered.

After all, we are looking at monumental programmatic changes in just the six weeks that have passed since NASA's ominous silence before this Committee.

How do we know that safety remained paramount in putting together this massive programmatic change?

Clearly, little thought was given about presenting this issue to Congress. I expect it is not a forlorn hope that NASA will put more thought into the decision itself, but I really wonder.

We must have a better sense of where the program stands today in terms of safety before rushing headlong into these new programmatic changes.

So, Dr. Littles, we are very fortunate to have you here today so that we can take this opportunity to learn how NASA intends to manage safety issues in the midst of a transition that is considerably more dynamic than the one NASA planned just six weeks ago, and why no one from the Agency felt the need to let us know it was considering this change before Tuesday noon.

I will now recognize the gentleman from Alabama, Mr. Cramer, to make an opening statement on the Democratic side.

Without objection, opening statements by other members will be included in the record following Mr. Cramer's statement.

The gentleman from Alabama.

Mr. CRAMER. Thank you, Mr. Chairman. I will be brief.

NASA's Space Shuttle Program has been and remains vital to our continued exploration and development in Space, of course.

The Shuttle is particularly important to north Alabama as the Marshall Space Flight Center in my District there plays a critical role in this program.

Marshall developed and continues to provide the Shuttle's propulsion system, the main engine, the external tank, and the solid rocket boosters.

While I am supportive of NASA in its efforts to decrease costs in these tight budgetary times, I am concerned about the safety, as you are, of the future Shuttle missions.

It has been announced that NASA would consolidate Shuttle operations with the United Space Alliance. I have questions about that. I am not opposed to that, but I want to know more about that, and I want to know more about the impact of that.

The two companies that have been involved have been extraordinary in their commitment to the Space Program but I just want to learn more how that impacts what we want to accomplish here.

So the Subcommittee here does need to know more information today, and I think we also need to be open to hearing from NASA over this very important issue.

Dr. Littles, we certainly appreciate your presence here today.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF HON. RALPH M. HALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Good morning. I would like to welcome Dr. Littles back, and wish him and the Shuttle team well on the upcoming flight to the Mir space station. It is clear that the Shuttle program is a central element of NASA's human spaceflight program and will be critical to the successful assembly and operation of the Space Station. While we should do all we can to improve the efficiency and lower the cost of the Shuttle program, we must make sure that we do nothing that jeopardizes the continued safe operation of the Shuttle.

As I stated in yesterday's hearing, I think that NASA has certainly stepped up to the challenge of providing a quality space program in the midst of severe budgetary pressures. The Shuttle has not been exempt from those pressures, and NASA has taken a number of steps to reduce the cost of its operation.

We have just been notified by NASA that it intends to award a non-competitive contract to the United Space Alliance to be the prime contractor of the Shuttle program. While I am sure that NASA would not propose such a step without sound reasons, we need to know the details of what is planned before we can give our approval. At a minimum, we need to understand the respective roles and responsibilities of the government and the contractors under this new arrangement. We also need to be convinced that safety will be protected—especially during the transition period to the new structure.

I hope that today's hearing will start to provide answers to some of those questions, and I look forward to Dr. Littles' testimony.

Thank you.

Mr. SENSENBRENNER. The gentleman from Florida, Dr. Weldon.

Mr. WELDON of Florida. I thank the chairman for yielding. I would just like to briefly add that I share many of the sentiments

he has expressed, but additionally I remain more and more concerned as time goes on that the process that we are engaged in has really been driven by dollars at the Administration level, and that a plan to safely execute this transition was never extant.

But I am very much looking forward to Dr. Littles' testimony to help enlighten us on this.

But I remain very concerned that decisions are being driven purely by dollars and not by concern to really maintain mission and safety.

With that, I will yield back to the chairman.

Mr. SENSENBRENNER. Thank you very much.

Our first and only witness today is Dr. Littles, who is the Associate Administrator for Manned Space Flight at NASA.

Dr. Littles, you may proceed as you will.

STATEMENT OF DR. WAYNE LITTLES, ASSOCIATE ADMINISTRATOR, OFFICE OF SPACE FLIGHT, NASA HEADQUARTERS, WASHINGTON, DC

Dr. LITTLES. Thank you, Mr. Chairman and Members of the Committee:

I am pleased to be here today to provide some of the detail that this Committee requires, and we fully understand our obligation to this Committee to make you aware of and a part of everything we are doing in this program, and it is our intent to do that.

I appreciate that in your letter you indicated I could take a few extra minutes, and I would appreciate doing that. I would like to go through some of the things that I have submitted in the written testimony to provide a thread for where we are in this program as a baseline for where we are going in the next few years.

Would you put the first chart up, please.

[Chart.]

As you well know, and we have talked about this, the program has been involved in change and, to some extent, restructuring over the last several years.

The chart on the easel shows the budget on the Shuttle program over the last three years. What you can see there is that in 1992 when we submitted the budget, this was the runout. The 1996 budget you can see is this dashed line here [indicating], and as we have gone through the budget process this year this is about what we see for the runout.

This includes all the things that we are doing to restructure the program, in our view. It includes all the reviews that you have heard about. function of work force review; the zero-base review; and all those activities.

So what the program has done over the three-year period from 1992 to 1995 is in effect reduce the Shuttle budget by about 25 percent. In doing that, the work force that works on the Shuttle program on the contractors' side and on the civil service side, is reduced also by about 20 percent.

If you will, put the second chart up.

[Chart.]

The second chart shows a history of the work force on the program over that period of time.

Mr. SENSENBRENNER. Let me make this suggestion so the people in the audience can see these charts. Could you move the charts over there in front of the Supernova, and we will kick the staff out and have them go to the standing room only, and I think that way everybody can see what you are talking about, Dr. Littles.

Mr. LITTLES. That is fine.

Mr. SENSENBRENNER. Thank you. I think this is much better, and you can now proceed.

Mr. LITTLES. Okay. The chart again shows the work force changes for that period of time. What you can see from that—and I will summarize the numbers at a later chart—but over that period of time basically the contractor work force was reduced by somewhere around 5,500, and the government work force as applied to Shuttle was reduced by about 750.

I will come back to that to compare where we're been to where we are going in a later chart.

Those reductions were taken in a number of ways. There was content that came out of the program, and I have summarized some of those things in the written testimony. I will not repeat all of that here. But there are some significant things like the advanced solid rocket motor was in the program at that time. Of course that was a major change when that came out.

We have reduced flight rate, and there have been some other content changes that have been made.

One of the significant things that has been done to reduce that budget is very carefully look at all the work that was going on across the program and make decisions on whether we needed to continue that work in a program that was operational, or whether we could reduce some of it.

I was involved myself as early as 1991 in reviewing programs at the Marshall Space Flight Center in looking at efficiencies that could be gained, and that could be terminated to make reductions.

Now we looked at that from the standpoint of what was required to do the job to process the hardware, to build the hardware, and to do it and do it safely.

In doing that, we made significant reductions. In the text of the written testimony, I talk about some numbers there. There was one particular contract that I looked at that had roughly a 3,000 work force and we reduced that by 1,000.

That program—and there was a contract modification made. That program has been producing hardware safely with no problems ever since.

I give that as an example because there were a number of activities across the program, some of them large and some of them small, who were looking in detail at the work to make the changes necessary to reduce budget. But to do it safely. Our record has shown that it has been done safely.

[Chart.]

Let me just say a few words about another review that has established the baseline that we have now. You have heard these words before, and this was Functional Work Force Review.

When we went through the budget exercise in the process of submitting the 1996 budget, when we went through that and looked very carefully at where the program was, there was some concern

across the program and across the agency that maybe we had taken with this significant reduction that is reflected here, maybe we had taken too much out of the program.

So we determined that we should go take a very careful look at the total program to make sure that we had not created any areas where we were at risk from a safety standpoint.

We did that with the so-called Functional Work Force Review. In doing that, we formed 13 teams and looked at almost every element of the program.

In the process of going through that review, we reviewed the work of some 25,000 workers, mostly civil service. We covered all of the contracts except for two, which had already been reviewed in that way.

There were two very important things that came out of that. We asked the teams to look at two things:

Go look at all the work going on and make sure that there are no places where we have safety issues, where we have taken out too many people; and also look to see if there are other areas that could be reduced.

The teams came back after several months and had found no areas where there were safety issues. They did find a few areas where we had reduced the work force to the point where we did not have schedule flexibility anymore.

If we have an issue or a problem, we have to bring people in from other places, but they found no safety issues.

They also found significant additional reductions that could be made. Those reductions that were identified are now reflected in the budget in the outyears and those changes are being made.

Would you put the next chart up, please.

[Chart.]

So in going through that, we have established a baseline for the program. We have established where we are in the program and the changes that we have already identified can be made and have been made in the past in a safe manner.

As we went through the budget exercise, and we had some discussion at the last hearing and there was some confusion about I think where we were going with the budget and I want to put this in the record, and it is in the written testimony, when we submitted the 1996 budget, we had a total set of requirements that amounted to some $18 billion, but we had already concluded that we could take reductions from that.

So when we submitted that budget, we had what we referred to at that point in time as an "unresolved" of $1.5 billion. There has been some confusion about that, because there have been some who thought that that was an additional budget cut. That cut was already in the budget and we were in the process of identifying in detail where those reductions could come.

As we went through the review in the spring, the so-called zero-based review, we identified additional areas where savings could come out of the program, and we also began to factor in in the outyears our assessment of the impact of going to a consolidated contract structure.

In doing that, we took another billion dollars out of the program. You see that spread on that chart between 1997 and 2000 with a reviewed budget that you see there on the bottom line.

So between the so-called "unresolved" that was in the budget and the additional billion, we are taking about over that period of time about $2.5 billion out of the Shuttle budget and reducing it to about $15.5 billion over the runout.

So those are the numbers, and those are the changes in budget we expect in the future.

That sets the baseline for where we are and where we have been for the last several months in planning and getting ready to do what we call restructuring of the program, which includes going to the single prime and consolidating contracts. It includes other things.

We have had underway for the last four or five months a detailed review of all the requirements in the program. This includes requirements that we have to process hardware at the Cape and other requirements in the program that dictate how we do work.

Those reviews are still continuing, but they are producing some positive change.

We also have made the decision that as a part of the process of going to the single prime contract and restructuring, we plan to freeze the design. As you know, we have had some activities going on where we have been doing redesigns and redesigning and redeveloping hardware to improve safety—a great deal of that on the Space Shuttle main engine; also some in the Orbiter.

We also have changes going on that are being implemented to provide an additional 13,000 pounds of lift capability for Space Station.

When those changes are complete, we expect to freeze the design on those elements and only make changes that are driven by obsolescence. We will continue to have some places where components become obsolete and we will have to make changes for that.

We would also, we expect, continue to have to make some changes for environmental requirements as the laws change. And if there are safety issues that come up, obviously we will make those changes.

But one of the fundamental things that we intend to do is to freeze the design to the maximum extent possible. We believe that the hardware is coming to the point now where that is possible in an operational program.

If you will put the next chart up, when we talk about restructuring the program, I want to spend just a minute talking about how the program is run today.

The Space Shuttle hardware was designed and is now operated using a multitude of contracts which are integrated by the government. The contracts report to different government organizations and our intent is to structure the operational part of the program, those things, those places where we conclude we are operational and consolidate that under one contractor.

[Chart.]

What you see on that chart is a representation of where we are today. The dark blocks are government organizations, and the white blocks under them are contracts. You see there are a lot of

contracts spread across all the centers, and the government is serving as an integrator at the top.

[Chart.]

In the next chart, when we consolidate and go to the single prime contract, the initial state that we expect will be to have a number of those operational contracts consolidated under the single prime contractor, and that is represented by the block in the middle.

You see on the left there the ground activities at the Cape, and on the right you see the base with the flat operations' activities at the Johnson Space Center.

On the left you see some continued dark blocks. Those are project offices where we still have development work going on. Included in that is the external tank which we are redesigning to reduce the weight of the Space Shuttle main engine changes that I mentioned.

There are changes going on on the redesigned solid rocket motor driven by environmental requirements, basically. And there are also some changes going on in the orbiter.

So when we initially established this contract, those projects that have significant development work will remain under the government management.

Those things that are operational in the middle will go under the single prime contract.

With time, as those development activities are continued—or completed, those projects' offices will go away.

[Chart.]

If you will put the next chart up, what we envision five years from now is that all those project offices will be gone and we will still have, as I said, some residual development activity that is reflected on the left.

We expect that to be basically managed out of the headquarters office with projects and our teams at the design centers as necessary to implement that work.

So from a structural standpoint, that is where we expect to go from this. A key to all of of this of course is how we get there from a transition standpoint.

[Chart.]

If you put the next chart up, as you know, we have had a Source Evaluation Board convened to put together a scope of work to go forward to establish this contract.

We have, as you indicated, decided that we would like to go with the United Space Alliance, and let me say a few words about that.

When we initiated the process to select this single prime contractor, we did something that was not exactly usual in going through this process.

We went out on August the 21st with a *Commerce Business Daily* announcement and asked contractors who might be interested in being the single prime to provide us some information on their capabilities and backgrounds with the intent of having our Source Evaluation Board review that data, and so that we could make a determination as to whether we should compete this contract or whether we should go with a sole source.

The Source Evaluation Board has been evaluating those data for the last several weeks. We and they have concluded that it is in

the best interest of NASA and the country not to go with a competition, but to go sole source.

That is driven primarily by the fact that we have a very ambitious schedule in front of us to get ready to launch the first U.S. launch for Space Station which is in December of 1997, just over two years from now.

If you look at all the schedule details between now and then, our conclusion was that if we did the competition, and if we selected someone who was not familiar with the work, not involved in the work, that the process of bringing a new group of workers and a new management team up to speed might seriously impair that schedule; that we might have schedule slips that would be very expensive.

Of course we have commitments internationally for the Space Station Program. We concluded that it would be in the best interest of all of us to go with that sole source USA.

USA of course has to go form that company. We have to go through a process that I will go into in a little more detail in a minute to get that contract in place, but the USA in terms of dollar value has about 69 percent of the dollar value of work on the Shuttle program.

If you look at those things that would be in the operations area, it is even more than that, about 80 percent. So we concluded that that team already has people there working. There would be much less schedule risk in having them consolidate the contracts with all their experience and capability than to have someone else do it.

Now where we are in the process is that of course we have submitted the determination and findings. There is 30 days there. And of course we are going to be working with you and with your staff to make sure you completely understand our rationale and what we have put into that contract.

I have a meeting next week to do some of that. But the process, if we continue it, would call for us to continue the work on the request for proposal that our Source Evaluation Board has been working on.

They would complete that within a couple of weeks. At that point in time we would meet with the contractors and begin to discuss that scope of work. We have that latitude in a noncompetitive procurement.

We would be in a position then by January to give that request for proposal to the contractor. In a couple of months, we would expect the contractor would have a proposal prepared.

Then we would begin to evaluate and negotiate that contract.

The schedule we had been working to under the competitive procurement, we believed we could have that in place by September. We may be able to do it a little faster in a noncompetitive mode; maybe a month or two. The actual time for final negotiation and the signing of that contract is going to be dictated a great deal by the negotiations themselves.

So we cannot put an exact date on that, but I think we will probably be able to do it a little quicker. So that is the time frame we are working on.

So we are still believing that this contract and the signing of it is still in the August-September time frame next year.

Let me say a few more words about the transition. The transition comes in two flavors. There is the transition associated with the contracts which are going to be a part of the single prime becoming a part of that prime, and that is not done all at one time.

What we envision right now is that we really have a three-phase process. The first contracts that would go into the single prime will basically be those contracts that the USA, Rockwell and Lockheed Martin, already have that are in the operational mode. I have a list of those, and I can provide those to you for the record.

[The list referred to follows:]

PHASED APPROACH

•PHASE I:

– NAS9-14000	ROCKWELL/ORBITER PRODUCTION
– NAS9-19000	ROCKWELL/SHUTTLE CONSOLIDATED (INTEGRATION)
– NAS9-18994	MARTIN MARIETTA/PYROTECHNIC INITIATOR CONTROLLER
– NAS9-18000	ROCKWELL SPACE OPERATIONS CONTRACT/(MISSION OPERATIONS @ JSC)
– NAS9-13300	ROCKWELL/PALMDALE FACILITY
– NAS7-300F	ROCKWELL/PALMDALE
– NAS9-13350	ROCKWELL/FACILITY ACQUISITION
– NAS9-16503	ROCKWELL/FACILITY
– NAS9-13662	ROCKWELL/FACILITY USE
– NAS10-10900	LOCKHEED/SHUTTLE PROCESSING CONTRACT (KSC)
– NAS10-12200	ROCKWELL/LOGISTICS

This list of contracts is subject to change based on ongoing Source Evaluation Board discussions.

PHASED APPROACH

•PHASE II:

– NAS9-17540	BOEING/FLIGHT CREW EQUIPMENT PROCESSING CONTRACT (FEPC)
– NAS9-18194	BOEING/FEPC FACILITY
– NAS9-19206	HAMILTON STANDARD/WASTE SYSTEM
– NAS9-18576	LORAL/PROGRAM COMPLIANCE ASSURANCE AND STATUS SYSTEM
– NAS9-18983	LORAL/DATA PROCESSING SYSTEM/SIMULATOR INTERFACE DEVICES MAINTENANCE
– NAS9-18800	JOHNSON ENG./FACILITY MAINTENANCE AND OPERATIONS (JSC)
– NAS8-36300	UNITED SPACE BOOSTERS INC (USBI)/SOLID ROCKET BOOSTER
– NAS8-32233	USBI/FACILITY
– NAS10-12000	EG&G/DELUGE & CRAWLERWAY OPERATIONS AND MAINTENANCE

This list of contracts is subject to change based on ongoing Source Evaluation Board discussions.

Attachment 3

PHASED APPROACH

•PHASE III:

– NAS9-18817	LORAL/FLIGHT SOFTWARE
– NAS8-40000	ROCKETDYNE/SPACE SHUTTLE MAIN ENGINE (SSME)
– NAS13-614	ROCKETDYNE/SSME TESTING
– NAS8-36200	MARTIN MARIETTA/EXTERNAL TANK
– NAS8-38100	THIOKOL/REUSABLE SOLID ROCKET MOTOR
– NAS8-39236	ROCKETDYNE/FACILITY
– NAS8-39243	MARTIN MARIETTA/FACILITY
– NAS8-38680	THIOKOL/FACILITY

This list of contracts is subject to change based on ongoing Source Evaluation Board discussions.

Attachment 4

We would expect those contracts then to fold under the single prime in that August or September time frame.

There would then be a second group of contracts which we consider to be operational in nature, which those companies do not hold. Those will take a little longer to get in there because there has to be detailed cost analysis done, and that takes some months to do that.

We would expect that those contracts would probably be folded into the single prime contract a few months later, probably four or five months later.

Then those contracts, as I mentioned on the other chart which are development in nature, we would complete those development—some of those contracts have production which would be there for the life of the program. After we complete the development, those production contracts would be then phased into the single prime.

I have lists of those three categories and dates, and I can provide that to you for the record. That will show how we expect to schedule the transition of the contracts.

There is another very important and critical aspect of the transition. You will notice there that the third bar from the top is entitled "Government Task Reduction and Transition."

As you know, our plan is that for those areas of the program which are operational, we intend to give more of the responsibility for those operations to the contractor and back away from that from the standpoint of our government work force.

We expect, though, that that transition will take some time. What you see there is the bar that shows about two years, and that bar represents a maximum transition length for those activities that are transitioned into the program initially.

We are doing a very detailed analysis of all those tasks that might go in there. Each one of the projects at KSC, and at Johnson Space Center, and at the Marshall Space Flight Center, are going through all the work that they currently do and assessing which of those jobs they would retain, which would go under the single prime, and in some cases the work would not be done anymore.

As I indicated when we met last, our schedule calls for that work to be complete at the end of the year, but let me show you some of the things as examples that are going on to produce that data.

[Chart.]

If you put the next chart up, I reviewed along with all the center directors and the program manager about three weeks ago the status of this activity, and it is going quite well.

This is an example of one area of work at KSC. This is the Shuttle Operations Organization. What you see there on the left is a summary of the tasks that they are doing today and, in the second column, that FTE is "full time equivalent" and is the number of people, equivalent people, that are doing that work.

You see on the right what they would expect to do, what they plan to do in that area after the transition is complete, what jobs they would still be doing, and in the right column the work force associated with that.

They have gone through a first cut of that. There is still a lot of work to do to finalize it.

At the other centers I have reviewed the same thing and they are also doing that work.

[Chart.]

On the next chart, what you see is a top-level chart. Again this is a KSC product that shows what they would expect to do during the transition period.

The initial phase of the work, which is reflected in the left column, is to develop metrics. We have to be very careful obviously in doing this. We have to have a way to measure the contractor coming up to speed and taking over these tasks. So we will be developing metrics to do that.

Then you see to the right in the next three columns some words that reflect the types of tasks that the work force would be doing, the government work force, and the kinds of things that contractors would be doing as we phase through time. This is roughly a two-year period.

When we get through that, then we would back off to the point where we would do what we are calling "audit surveillance and insight."

I would like to say a few words about that later. I am going to talk about audit and surveillance and insight when I get over to the safety presentation.

Mr. SENSENBRENNER. Dr. Littles, may I ask that you wrap up your testimony in about 10 to 15 minutes, because we would like to get this hearing over with by noon, and there are eight Members present at five minutes a piece who would like to ask some questions. So if you could, please.

Mr. LITTLES. Yes, sir. I can do that.

How about putting up Chart 10, if you will.

[Chart.]

What this chart does is to give a summary of the work force as we see it, both contractor and civil service. It shows where we were in 1992 in the left column, in the center, and the top; you see where we are now, and where we expect to go when we finish this transition by the year 2000.

And the bottom set of numbers—yes, that's it; yes—the bottom set of numbers shows the reductions. The first line shows the number of civil service and contractors that were reduced between 1992 and 1995. You see that total is about 6700. Then, the bottom line, the number we expect to be reduced over the next five years, and that is a total of about 7500.

So what we are going to do over the next five years is roughly, in terms of work force, is roughly comparable to what we have done over the last three years.

Let me go on then to "Maintaining Safety," which we covered in the written testimony and I would like to summarize some highlights of that.

The bottom line to all we are doing here has to be that we maintain safety in the Shuttle program. Safety is our top priority, has been, and must continue to be.

We did a number of——

Mr. SENSENBRENNER. This looks like a good time to recess for ten minutes. The Committee stands in recess.

[Recess.]

Mr. SENSENBRENNER. The subcommittee will be in order. We expect to have another vote on the Floor of the House in about an hour on a motion to instruct conferees relative to the tort reform bill. I would ask Dr. Littles if he could conclude his testimony in five to eight minutes. That will allow enough time for members of the subcommittee to ask questions. Because I fear if the next vote comes we will not have anybody come back after that.

So, Dr. Littles, please summarize.

Mr. LITTLES. Yes, sir.

I would like to say just a few words about maintaining safety, which is a critical part of all this. I include a lot of this detail in the written statement, so I will not go over all of it.

Subsequent to Challenger we made a number of changes in the program which are going to be maintained as we move through this transition period and into the operational program.

One of the things we did was clearly identify and channel reporting channels so that we had the right reporting system and the right people were involved. That will be maintained as we move through the program.

We instituted information systems so we could track problems and knew where problems were. Those systems will be maintained.

We instituted processes to make sure that the total community, both contractor and government, were well aware of all the issues before each flight. The flight readiness review process that we go through is the epitome of that.

I chair the board. We have a face-to-face meeting with all the projects and all the managers to review all the issues, and that will continue.

I will still in the program after its transition completely, I will still chair that board and I will still review all the issues before we fly.

We instituted an independent anonymous reporting system that will be maintained. The Safety and Mission Assurance Organization of course underwent a major change after Challenger.

It became an independent organization responsible for insight and oversight of the program, and that will continue. After we restructure the program, they will still be the safety conscience of the program.

We have established a lot of metrics in this program that we use to track the work to understand where problems are occurring relative to errors.

There is a set of these metrics that we track here in Headquarters. There are metrics that the projects track. All those things will be maintained.

In addition to that, we are generating, as I mentioned a minute ago, additional metrics to make sure that we transition this program safely.

We will continue on the government side to have independent assessment—we refer to it as "insight"—to all problems and technical issues that occur on the hardware that might in any way influence the flight.

Our engineering people on the government side will still do that work. We are strengthening our audit program. I found two or

three years ago that one of our weaknesses was that we did not do enough detailed audits in our contractor plants.

We have changed our audit procedures and I have implemented that across the total program. And of course we will still have surveillance of the processes and procedures, making sure that the people who are doing the work are trained and the word processors are being followed.

One of the things that I should mention is that we are moving to a new way of doing business in some of our operational organizations at KSC and to some extent at JSC as well, but this is not a new way of doing business for the program.

At KSC we have a situation where our government people are day to day and routinely managing each and every element of the work.

In other parts of the program where we build hardware—for example, at Rocketdyne, we revealed a very critical Space Shuttle main engine. We only have 10 civil service employees in that plant. That is very critical work. The same thing with the external tank. The same thing with the solid rocket motor in Utah. We have on the order of a dozen people in those plants.

In addition to that, we have maybe 30 DCMC folks who help us do audit and surveillance. We do that work at those contractor plants, that very critical work, the same way we are going to change our mode of operation in the operational aspects and do it there at KSC and JSC.

So we are not moving into something this program has not done. We are changing some areas that have not done it that way, but we have done this work before.

The bottom line is we are going to maintain safety as we move through this transition. We are going to measure it and monitor the work and make sure that we transition it safely, and safety will always be our first priority.

With that, Mr. Chairman, I would like to submit my written testimony for the record.

Mr. SENSENBRENNER. Without objection, it will be included.

[The prepared statement of Dr. Littles follows:]

Hold for Release Until
Presented by Witness

Statement of

Dr. J. Wayne Littles
Associate Administrator
for Space Flight
National Aeronautics and Space Administration

before the

Subcommittee on Space and Aeronautics
Committee on Science
United States House of Representatives

November 9, 1995

Mr. Chairman and Members of the Subcommittee:

I am here today to discuss the restructure and transition of the Space Shuttle program. Our primary and overriding requirement will continue to be maintaining safety as we plan the required changes, move through a transition period, and operate the restructured program. I will discuss our restructuring plans with particular emphasis on measures that we will take to insure continued safety.

We are confident that the restructuring of the Space Shuttle program can be accomplished safely, and our plans will insure that we do so. The processes to be used in management of operations will be new to some of our operations organizations. However, we use similar techniques in managing our extremely critical and often times process critical manufacturing operations at our Space Shuttle Main Engine (SSME), External Tank (ET), and Redesigned Solid Rocket Motor (RSRM) plants. Before addressing our plans for restructuring and the measures being taken to insure safety, both during and after transition, I would like to provide some relevant background information.

BACKGROUND

Cost Reductions

Since 1992, the Space Shuttle program has maintained a safe and reliable launch system while reducing costs. The Associate Administrator in FY 1991 set as a goal, a

15% reduction in costs within five years. Today, in November 1995, we have reduced costs 24% (over 30% in FY 1992 $'s), far exceeding the original goal while maintaining a safe flight rate and meeting our customers' requirements. (**Attachment 1**)

Program Changes to Accommodate Cost Reductions

From 1992 through 1995, there were program content changes, including reduction of planned flight rate from 10 to 7 per year, deletion of the Long Duration Orbiter project, deletion of the upgraded Checkout Control Monitoring System at KSC, deletion of the Orbiter Structural Spares project, cancellation of the Advanced Solid Rocket Motor program, deletion of the Block II Enhanced Controller for the SSME, and deletion of several RSRM flight support motor test firings.

There were also major reviews of specific program areas to drive out low priority work and improve efficiencies. These reviews resulted in a variety of process changes, task reductions, requirement scrubs, contract restructures, and literally thousands of continuous improvement changes at all levels. For example, during this timeframe I led a team which conducted a detailed task-by-task review of all work being performed by one of our major contractors. Our team concluded that we could eliminate approximately 1000 of the 3200 total project employees without any impact to the essential work required. The contract was renegotiated to accommodate these changes resulting in $500M in savings over the contract life. The streamlined workforce has been in place for some time with no impact on safety or productivity. This is an example of efficiency improvement achieved through elimination of low priority and noncritical work. There have been numerous other such exercises which have allowed us to achieve budget reductions.

Workforce Reductions

The program changes and cost reductions resulted in significant workforce reductions for both contractors and civil service. **Attachment 2** reflects the resulting reductions over the FY 92 - FY 95 timeframe.

Buyouts

In FY 94 and FY 95, NASA provided a buyout opportunity to employees to encourage attrition in support of the Agency commitment to reduce civil service personnel. As might be expected, a number of people taking advantage of this opportunity provided support to the Shuttle program. Some provided full-time direct support while others provided part-time, matrix support for specific tasks or on an as needed basis. All vacancies created by these actions were assessed by the program or Center and have been either filled, the work reassigned, the tasks completed or eliminated, or, in a few cases, positions are being temporarily filled while formal replacement procedures are completed. We have lost some good people, however, every

critical position left vacant through the buyout was filled. The tally on **Attachment 3** provides information of the buyouts on a Center-by-Center basis.

Functional Workforce Review (FWR)

By late 1994, changes to program content, requirements, and operations had resulted in significant cost savings and relatively dramatic reductions in workforce. Program and Center managers became concerned that these dynamic changes may have inadvertently created subtle but critical deficiencies that, if not corrected, could represent program risk. The Associate Administrator for Space Flight ordered a programwide Functional Workforce Review to: 1.) look for any safety deficiencies in the program resulting from the previous three-years of downsizing; 2.) verify every task, function, organization, and worker, both government and contractor, required to safely fly seven flights per year; and 3.) recommend any improvements, additions, or cuts as appropriate. This review concluded that: 1.) currently there are no safety "holes" in the program; 2.) there are several areas where previous cuts have resulted in a lack of schedule flexibility; and 3.) there are still reductions to be made in tasks, functional overlaps, and program requirements which will allow further reductions in the workforce through FY 1997. These additional reductions are reflected in our budget planning. Although most of the reductions will be made by the end of FY 97, these cuts will have long-term effects on our out-year budgets as they allow us to do the job with fewer people than previous planning anticipated.

Additions to Program Content

The prior section related changes to the program during FY 92 - FY 95 which resulted in reductions. Significant content increases were also made during that timeframe. A number of design changes to improve safety were initiated or continued:

1. Space Shuttle Main Engine changes included a heat exchanger redesign which eliminates critical welds, incorporation of a new high pressure oxidizer turbopump which eliminated hundreds of welds and improved operating margins, a new high-pressure fuel turbopump which provides similar advantages to the oxidizer turbopump, and a large throat main combustion chamber which significantly reduces internal operating environments for the engine.

2. On the Orbiter, upgrades have been made to the gaseous hydrogen flow control valve to reduce the amount of contamination deposited on the valve, thereby reducing maintenance requirements. Work is also continuing on the auxiliary power unit gas generator valve module to reduce the concern for overspeed conditions. This modification is expected to be integrated into the fleet in late 1997. The Multifunction Electronic Display System (MEDS) is an Orbiter upgrade that will replace obsolete navigation aids as well as transition to new, more reliable display units in place of the aging display system. MEDS is scheduled to be operational by July 1998.

In addition to safety improvements, it is necessary to increase the Space Shuttle's payload lift capability, i.e., performance, by 13,000 lbs. to support the international Space Station (ISS) orbital altitude and inclination. Several performance enhancements are currently in work. The development and manufacture of a Super Lightweight Tank will increase performance by approximately 7500 lbs. by use of high strength, low density, aluminum-lithium alloy; by selective redesign of certain structural components; and by further optimization of the thermal protection system. Orbiter modifications include incorporation of lighter weight crew seats, thermal protection system redesigns, and removal of cargo bay liner material not required for international Space Station (ISS) missions. In addition, redefinition of required consumable loadings and selected flight software changes account for the majority of additional performance enhancements. All required performance enhancements will be certified ready-for-flight prior to the first ISS flight in December 1997.

PROGRAM CHANGES - 1996 - 2000

Budget

The Shuttle program budget submitted to Congress for 1996 reflected a five-year runout (1996-2000) of $16.501B (**Attachment 4**). Requirements over this same timeframe actually totaled $18.0B, a difference of $1.507B from the submittal, which we internally classified as "unresolved." The Shuttle program was committed to a $16.501B budget, however, we had not yet fully determined what program changes were required. Subsequently, those tasks identified during the FWR for deletion and the corresponding workforce reductions and savings made significant contributions to eliminating the "unresolved." The Spring Shuttle program budget (POP 95-1) exercise and the Zero Base Review (ZBR) completed the task of eliminating the "unresolved" and allowed an additional budget reduction of $1.0027B over the 1996 - 2000 timeframe. Those last two activities also included savings from Shuttle program restructuring.

In summary, since the 1996 budget submission, the Shuttle program has produced an effective savings of $2.516B and has reduced its budget requirements for 1996-2000 by $1.0027B. This $1.0027B budget reduction is part of the $5.0B reduction requested of NASA during the 1996 budget exercise. It was not reflected in any way in the Shuttle budget in the 1996 budget submission to Congress, but was partially reflected in the overall Human Space Flight budget line.

The Space Shuttle program has included the results of all reviews conducted as well as anticipated savings from future restructuring in formulating the ZBR budget reduction and eliminating the "unresolved" portion of the 1996 budget submission.

The Shuttle program will meet the reduction challenge by restructuring and other changes. This entails workforce and content reductions that are assumed in our budget planning. **Attachment 5** summarizes these changes as well as additional requirements which are being accommodated.

RESTRUCTURING

General

The Functional Workforce Review results are being implemented at this time and are assumed in our current budget planning. However, the FWR was conducted in the context of today's program organization with a Headquarters program office overseeing a multitude of Center managed projects (Orbiter, Software, SSME, SRB, ET, Launch and Landing Operations, Mission Operations, etc.). Previous reviews were also conducted in the context of today's top-level program requirements which prescribe the maintenance and turnaround philosophy for Shuttle hardware refurbishment and launch preparation. As we approached FY 96, it was clear that the only way to further reduce workforce (and therefore program cost) was to add three more major initiatives to the ongoing program restructure:

1. a thorough top-down requirements scrub,
2. a freeze in the design,
3. a major reorganization of the Program, focusing on contract consolidation with attendant civil service reductions.

Requirements Review

The requirements review is essentially complete with implementation plans in the approval cycle. Some significant changes in operations policy, such as increased intervals between certain hardware inspections (considering operational experience as well as potential severity and probability of failure), and criteria for repair of failed hardware will result in cost savings which are being assumed in our current budget planning.

Design Freeze

By late 1997, the majority of development work will be complete on the Super Lightweight Tank, Main Engine modifications, and performance enhancements. Thereafter, we will limit changes to those required for environmental regulation, obsolescence, or safety reasons.

Program Reorganization

The Chris Kraft study, a top-down look at a streamlined program organization, recommended a single prime contractor concept for contract consolidation. It suggested deleting all NASA project offices dealing with operations and having the work done by those projects' contractors be managed instead by the new prime contractor. The prime contractor would then report to a single NASA program office. In addition, NASA is supporting governmentwide initiatives to reduce the civil service workforce. NASA's vision is to focus its employees on tasks related to research and development and less on

operations. Consistent with the recommendations of the Kraft Report and the Agency plans for civil service downsizing, we have established a set of principles for Space Shuttle reorganization. These principles were distributed to the program elements and Centers in March of this year with the intention of achieving several key goals:

1. Achieve more focused responsibility and accountability by contractors, including a single contractor accountable for operations.

2. Strengthen audit/insight of contractor work to increase safety.

3. Reduce operations costs.

4. Focus the government workforce on research and development.

5. Establish a framework for possible eventual privatization.

According to the principles, the new contract restructure and consolidation will be accomplished using the following:

1. Overriding Consideration to Continue to Fly Shuttle Safely
2. The Transition to a Restructured Shuttle Program will be Carefully Planned and Controlled to Ensure Safety
3. Contractor Accountability and Responsibility will be Maximized by Consolidating Contracted Efforts and Transition to a Single Prime Contractor for Management and Performance of Ground and Flight Operations and Integration
4. Government Management will be Streamlined
5. Government Workforce Involvement in Performing Routine Operations will be Minimized -- Contractor will be Responsible and Accountable for these Functions
6. Insight by Government Engineers and Managers for any Anomaly or "Out of Family" Occurrence in Processing, Production, Flight Preparation, or Flight will be of Sufficient Depth to Provide an Independent Assessment
7. Government Role in Safety and Mission Assurance will be to Ensure that Quality Hardware and Services are Delivered by Contractors with a Primary Emphasis on Insight, Audit, and Surveillance--S&MA Functions will Continue to be Conducted Independent of the Program
8. Program Requirements will be Reduced but will be Consistent with Safe Flight Operations
9. Government will Retain Responsibility for Managing Design and Development Activities--Design Modification will be Introduced in Block Changes
10. Production for Flight Hardware/Software will be Transitioned to the Prime Contractor Consistent with the Maturity of the Design and Production Processes and the Degree of Continued Need for Government Management and Insight

11. Shuttle and Space Station Operations will be Consolidated

Attachment 6 shows the current schedule for the transition. The plan is to have the single prime contract signed by the fall of 1996. At that time, we will begin a transition period of up to two years for those project elements which will be initially included in the single prime contract. (Actual time will be dependant on real-time measurement of progress.) During the transition period, the government people doing jobs today will train the new contractors and bring them onboard in a measured and methodical way. During this time, the contractors will successfully demonstrate their ability to do the jobs. The civil servants will take on their new role as providers of insight for the NASA program manager; and will no longer supervise the day-to-day contractor operational activities. The remainder of the transition period is involved with the new prime establishing contracts with its new subcontractors, and the NASA personnel taking on their new roles.

Because there are still significant development activities in some of the Shuttle projects (i.e. Block II SSME and Super Lightweight Tank), the development/production contracts will remain as NASA managed projects until their completion. That is why the transition timeline shows transition out as far as the year 2000. In effect, the new prime contractor will inherit a substantial amount of work at contract start (including mission operations at JSC and launch/landing operations at KSC), but will pick up various hardware production contracts in stages through the first 5 years of the contract.

NASA has asked the Aerospace Safety Advisory Panel to monitor our transition planning and the restructure. They are establishing three special task groups to look at the following:

1. Shuttle support of Station during restructure
2. Restructure and reorganization
3. Space Shuttle processing and operations at KSC during and after transition

Civil Service Work force Reductions

One of the fundamental guidelines established for the Shuttle program restructuring was to turn routine operations over to the contractor. This requires a major change in some organizations' current contractor/government relationships where the government employees are integrally involved in day-to-day oversight roles (management/supervision), and in actual conduct of operations work. While there is no question that the government tasks selected for transition to the contractor can be performed by the contractor personnel, a careful assessment of government tasks must be conducted to assure that no critical tasks are eliminated. It is also necessary to plan and execute a transition plan to allow the contractor assuming the tasks to be fully trained and proficient.

In order to insure that all government tasks are carefully examined and to form the basis of the transition plan, the program and all Center organizations supporting the Shuttle program have been reviewing each and every task currently performed by the government workforce. These tasks are being assessed to establish the appropriate disposition, i.e. a) eliminate the task (redundant or unnecessary), b) transition the task to the contractor, or 3) retain the task if it is necessary to satisfy continued government responsibilities. This work is continuing and, as I testified in September, I expect the work to be completed by the end of this calendar year. The results are being reviewed by the program, Center management, and by me. Based on my last review in late October, the work is progressing on schedule, and I expect it to produce the required results.

Initial estimates provided by Shuttle program and project leadership, without benefit of detailed assessments, indicated that the civil service workforce could be reduced by approximately 1475. These estimates were included in ZBR overall workforce reductions. For the Office of Space Flight Centers, the total ZBR workforce reduction was approximately 2400 positions which included all work performed at the Centers, not just Shuttle. Current assessments of Shuttle workforce reductions total 1347 out of approximately 3000.

To illustrate the details associated with the task assessment, **Attachment 7** is provided as an example of an assessment product. The attachment illustrates the preliminary assessment for one KSC organization. In the left column, tasks performed today and the equivalent personnel required are indicated. The right hand column indicates the task content following transition and the resulting equivalent personnel required. This assessment, as are all others, is being conducted by the Center responsible for the work.

Once the task assessments are complete, transition schedules will be developed. For some time after the prime contractor selection, the government workforce will continue to be closely involved with tasks being transitioned to assure that the contractors assuming the work are fully trained and capable. Again, to illustrate the products and plans being produced, a KSC product is provided as **Attachment 8**. This chart illustrates the gradual and carefully planned transition of responsibilities. Key features are: 1) developing and utilizing metrics; 2) transition of tasks in a phased manner based on criticality; and 3) the evolution to a government mode of insight, audit, and surveillance. We expect to have the preliminary transition plan by early 1996.

Contract Fee Structure

When establishing the fee structure of the new prime contract, our plan calls for several key principles:

1. A cost plus award fee/incentive fee which is consistent with program priorities.
    a. safety of flight

b. meet the manifest (includes meeting schedules, satisfying customers, and mission success)
c. cut costs

2. Appropriate penalty for catastrophic losses
3. A plan which calls for interim fee payments based on six-month evaluations of contractor performance, with periodic lookbacks to cover long-term trends and program health.

Management Plan

The NASA program manager is developing the Program Management Plan which outlines the relationships between government and contractor, program, and Safety and Mission Assurance (S&MA) organizations, program and center support organizations, and Shuttle and Space Station programs. This plan will include detailed coverage of the following:

1. Government/contractor roles
2. Contract management (including performance evaluation process)
3. Requirements management
4. Technical board structure
5. Matrix support from the Centers
6. Certificate of Flight Readiness
7. Program integration
8. Development versus operations management
9. Strategic planning
10. Government organizational structure

The Program Management Plan is scheduled to be essentially complete by January 1996. It, along with detailed transition plans, will continue to be refined through FY 1996 to guide the Shuttle team's transition next fall to the selected prime contractor.

MAINTAIN SAFETY

The restructuring of the Shuttle program will be accomplished consistent with our established program priorities : **1) Fly safely; 2) Meet the manifest; and 3) Reduce costs.** The following paragraphs address the processes currently used to ensure safety and our plans to continue to insure safety during the program transition and in the restructured program.

Changes Following Challenger

Following the Challenger accident and guided by the findings of the Report of the Presidential Commission on the Space Shuttle Challenger Accident - the "Rogers Commission Report" - NASA conducted an intensive, across-the-board effort to return to safe, reliable space flight. Numerous hardware, software, and process safety

improvements were incorporated and both risk identification and reduction programs were put in place. The Space Shuttle program was reorganized to ensure that all necessary information was available to managers at all levels, i.e., communication channels were greatly enhanced. The Program Compliance Assurance and Status System (PCASS) and the Problem Reporting and Corrective Action (PRACA) system were set up to implement the information flow required. In addition, to clarify information reporting channels, the top three Space Shuttle managers at the Johnson Space Center, the Kennedy Space Center, and the Marshall Space Flight Center were reassigned as Headquarters personnel reporting directly to the Washington, D.C. based Space Shuttle Program Director.

All program documentation was reviewed, and previous waivers and deviations were revoked. Reestablishment required detailed analyses by both contractor and civil service personnel at all levels of management. Failure Modes and Effects Analyses were performed for every item, resulting in a Critical Items List. Fault trees were generated to characterize each subsystem. Disposition of every item reviewed was made through the Program Requirements Control Board system at each level of the program, with final disposition made by the Space Shuttle Program Director chaired Board. A detailed systems analysis was also accomplished for flight software. A review of every line of code was performed beginning with the Flight System Software Requirements (FSSR's). The FSSR's were reviewed and rewritten to enhance safe operation. The new flight software was built according to, and verified with, these requirements.

In addition to the redesign of the Solid Rocket Motor, and in line with theRogers' Commission findings, extensive landing safety improvements, e.g., Orbiter tire, brake, and nose wheel steering upgrades, and a drag chute system were incorporated. A crew escape pole and slide were installed in the Orbiters allowing crew escape as an option in case of a major vehicle malfunction during ascent. Also, as previously mentioned, hardware and software upgrades are continuing to provide a safer and more reliable vehicle. These additional upgrades will be carried to completion in the restructured program and the other changes made will be maintained.

Communication

Critical to the success of the program following the Challenger accident are the processes which have been implemented to ensure complete and open communication of safety related issues. The commit-to-flight process epitomizes these principles. Each project reviews every issue and anomaly which could have any effect on the upcoming flight. Any technical issue is subjected to independent assessment by the government workforce. Through a series of open reviews, all significant issues and open items are elevated to a Flight Readiness Review Board chaired by the Associate Administrator for Space Flight. This review is conducted "face-to-face" with all projects and senior government and contractor management in attendance. Through this process, full and open discussions of all potential issues are reviewed and assessed by all levels of program management, engineering, and safety and missions assurance organizations. The recent

instances of launch delays prior to the STS-73 mission are evidence of the success of this system.

In addition to the formal open communication system, a system is in place to provide a mechanism for anonymous, voluntary and responsive reporting of concerns or risks. The NASA Safety Reporting System (NSRS) is available to both NASA and NASA contractor employees and has served as an effective supplemental reporting channel to augment existing means. The organization that processes the NSRS inputs is a private contractor. Shuttle related ground and flight safety concerns reported through the NSRS are worked directly by senior safety and program personnel. NASA believes that this system remains an effective "safety valve" that contributes to the overall Shuttle safety program.

All of these communication channels will be maintained during and following transition. While the prime contractor will assume a major role in the Flight Readiness Review process, the essential nature of the process will not be changed. The Associate Administrator for Space Flight will still chair the board, all issues will be addressed during the review process, and the government will still conduct independent reviews of any issue or anomaly which might pose a safety of flight issue.

Maintaining Critical Skills

As we move through the transition period and into the restructured program, it is essential that the government maintain a cadre of skilled personnel to conduct the required audit and surveillance and to provide the necessary insight and independent review essential to continued program success. We will continue to depend on our program and line management to insure that the engineering and quality assurance skills are available. The organizations will cover skills lost by reassignment or outside hires if required. If critical technical positions cannot be filled by these means in a timely manner, contractors will be used as required.

In some cases, necessary skills will be drawn from matrix support organizations which provide personnel resources for multiple projects. The continued necessity to conduct audits, surveillance and independent investigations will require that a cadre of personnel be assigned full time on Shuttle tasks. Also, some critical skill positions will be retained by civil servants. Examples are flight controllers, test directors, launch directors, crew members, and flight surgeons.

Audit, Surveillance and Insight

While we will not provide day-to-day oversight of routine operations, we will maintain in-depth knowledge of the integrity and health of contractor processes and products to insure safety and mission success. We will maintain technical insight into contractor activities, gathering product or process data that provides adequate visibility into the integrity of the product or process. To provide this greater insight into contractor

operations, the NASA Engineering and Quality Audit (NEQA) program, an improved approach to audit using engineering and quality personnel to verify stability of processes, has been implemented. The NEQA program uses a two-phase audit approach (contractor self-audit and NASA on-site audit), providing a method of evaluating processing systems and procedural interrelationships, the effects of management systems, and hardware controls. In addition to NEQA, in-plant surveillance will be utilized, including but not limited to selected high risk items such as proof test results, systems tests, checkout, and validation process control, training, and configuration management.

All technical issues and any problems or anomalies (occurring either during ground processing or flight) which are unique and not previously addressed will be subjected to independent assessment by government personnel. All such issues and the independent assessments will be included in the Flight Readiness Review process.

Metrics

Metrics have been established to monitor parameters which indicate the health of the program and are indicative of safety related trends, **Attachments 9 and 10** are examples. These include in-flight anomalies, error rates, and operations problem reports. These metrics and others will continue to be monitored and corrective action taken where problems are indicated. In addition, more detailed, task specific metrics will be established to assess the transition of work to the contractor.

Role of Safety and Mission Assurance (S&MA)

Currently NASA Safety and Mission Assurance (S&MA) has assurance responsibility over all anomalies and issues. Through the initial operating stage of the new contract, S&MA will continue to maintain this responsibility. Once the contractor's processes and decision-making capability are found to be robust and stable in this stage, the contractor will then enter into the intermediate operating stage. In the intermediate operating stage, S&MA will decrease its scope and slowly back away from day-to-day operations. Again, S&MA will closely monitor the contractor's progress. When the contractor has demonstrated stable processes and successful performance, S&MA will enter the final operating stage. In the final operating stage, NASA S&MA will have cognizance of only "significant" anomalies (outside of our experience base) to ensure minimum risk to flight safety is appropriately considered.

S&MA conducts an independent commit-to-flight process which stresses assessment of all Shuttle processing activities and known issues and constraints. It consists of three incremental mission specific S&MA reviews prior to each Space Shuttle launch. Pre-launch Assessment Reviews, Flight Readiness Reviews (which S&MA co-chairs), and Launch Minus 2 Days reviews keep all organizational levels of S&MA apprised of status, progress, issues, and concerns, and remaining open work to be accomplished before a mission is certified to fly. The S&MA commit-to-flight process has been refined over time and is robust and stable. It has been successfully executed

since Return-to-Flight and it will continue to ensure that all critical path processes are verified for flight readiness.

S&MA will be transferring responsibility and accountability to the contractor S&MA for selected tasks currently performed by NASA S&MA and/or the Defense Contract Management Command (DCMC). NASA S&MA will assure that the transitions are conducted in a controlled, effective and reliable manner. NASA S&MA studies have shown that redundant Government Mandatory Inspection Points (GMIP's) dilute accountability and do not ensure achieving a successful process. The GMIP's will be phased out of stable processes over the next few years. The contractor will perform 100% of the critical inspections while the government S&MA and engineering organizations will conduct a robust surveillance program.

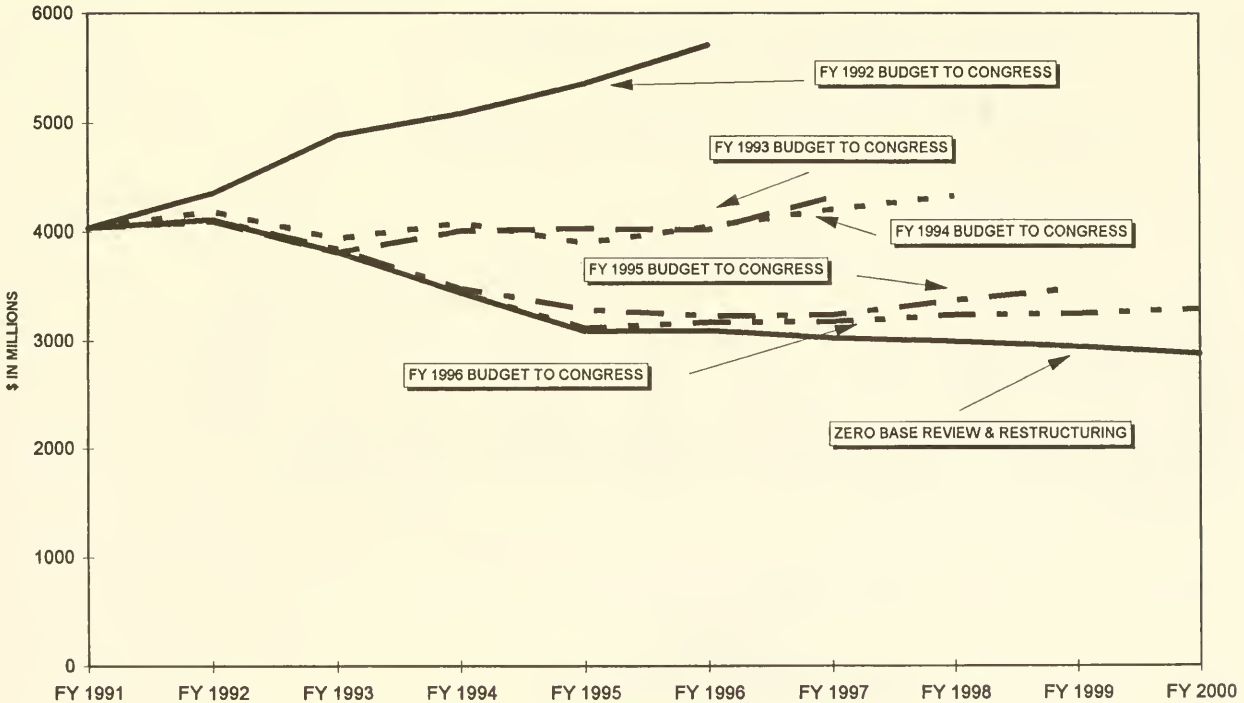
NASA S&MA will rely more on validating the processes the contractor uses to conduct in-plant work and less on inspecting the final product. They will be key members of the aforementioned NEQA audit team. Also, DCMC and NASA resident office S&MA personnel will be co-located in work teams, work centers, and work areas as necessary to monitor processes, documentation, and hardware.

NASA S&MA will play a critical role in the Space Shuttle program management plan, transition process, and in the restructured program. S&MA will maintain its organizational independence from the program and remain vigilant to ensure that the appropriate contractor oversight and NASA insight functions are established for the future. It will continue to act as NASA's "Safety Conscience," conducting evaluations and independent assessments and assisting the program manager to ensure flight and ground safety remains the first priority of NASA's Space Shuttle program operations.

Conclusion

In closing, I would like to say that transition to the prime contractor will be deliberate and methodical. We are not going to transfer any task or process to the contractor which, in any way, might jeopardize the safety of any member of the Shuttle team. Safety improvements instituted since the Challenger accident will be maintained and further improved during the restructure. I feel confident that each individual involved in the Shuttle program takes responsibility for flight safety. **The Space Shuttle program priorities are, and will continue to be -- fly safely, meet the manifest, and reduce costs, in that order.**

SPACE SHUTTLE PROGRAM
BUDGET REDUCTIONS



Attachment 1

10/31/95

Space Shuttle Program Workforce Reductions By Center FY 1992 - FY 1995

	FY 1992			FY 1993			FY 1994			FY 1995		
	CIVIL SERVANTS	CONTRACTORS	TOTAL	CIVIL SERVANTS	CONTRACTORS	TOTAL	CIVIL SERVANTS	CONTRACTORS	TOTAL	CIVIL SERVANTS	CONTRACTORS	TOTAL
Total	3832	31648	35480	3751	29519	33270	3432	27239	30671	3098	25707	28805
JSC	1413	10312	11725	1368	9867	11035	1316	8879	10195	1308	7774	9082
KSC	1393	9780	11173	1373	9697	11070	1194	8759	9953	994	8759	9753
MSFC	908	11193	12101	892	9808	10700	799	9051	9850	676	8642	9318
SSC	34	255	289	34	239	273	39	495	534	40	501	541
OTHER	84	108	192	84	108	192	84	55	139	80	31	111

- All numbers are in full time equivalent persons
- Contractor numbers are direct, indirect, and major subcontractors over $2M

Attachment 2

File: 92to95cs.xls

COMPARISON OF SHUTTLE WORKFORCE POSITIONS
vs
TOTAL NASA BUYOUTS BY CENTER

Centers	Total (1) Buyouts	Shuttle Workforce (Full Time Equivalent) (2)	Shuttle FTE's	
			Replaced	Completed or Eliminated
JSC	341	135	52	83
SSC	13	1	1	0
MSFC	521	135	67	68
KSC	317	230	90	140
Total	**1192**	**501**	**210**	**291**

(1) Includes FY 94 and FY 95
(2) Full Time Equivalent (FTE) represents the number of Shuttle work years reflected in the total buyout. Some individuals only worked part-time on the Shuttle Program.

Attachment 3

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
HUMAN SPACE FLIGHT
SPACE SHUTTLE PROGRAM BUDGET COMPARISONS

	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	TOTAL
FY 1996 CONGRESSIONAL BUDGET	3,232	3,244	3,319	3,335	3,371	16,501
UNRESOLVED IN 1996 BUDGET	(287)	(309)	(276)	(299)	(335)	(1,506)
ZERO BASE REVIEW BUDGET REDUCTION		-49.2	-244.8	-303.7	-405.0	-1002.7
REVISED BUDGET	3,232	3,194	3,075	3,032	2,966	15,499
EFFECTIVE SAVINGS:	(287)	(359)	(520)	(602)	(740)	(2,516)

Attachment 4

SPACE SHUTTLE PROGRAM
TRACE

	TOTAL FY96 - 00
OUR REQUIREMENTS THIS TIME LAST YEAR FOR FY 1996 - FY 2000 EQUATED TO:	18,007
WE SUBMITTED A BUDGET IN JANUARY OF OVER THE SAME TIME PERIOD OF:	16,501 (1,506)
SINCE THAT TIME, WE ACCEPTED AN ADDITIONAL BUDGET REDUCTION CHALLENGE OF:	-1,002.7
FOR A TOTAL REQUIREMENTS CHALLENGE OF:	-2,516

HOW HAVE WE MET THAT CHALLENGE? BY THE FOLLOWING CHANGES:	TOTAL FY96-00 REDUCTIONS
FUNCTIONAL WORKFORCE REVIEW REDUCTIONS:	-1,077
DELETE REDESIGNED SOLID ROCKET MOTOR NOZZLE PRODUCTION @ IUKA	-226
DELETE SOLID ROCKET BOOSTER & EXTERNAL TANK RECOMPETITION	-170
REDUCE RESERVE LEVELS	-118
CONDUCT ORBITER MAINTENANCE DOWN PERIOD's @ KSC < FY96	-108
RESTORED REDUCTIONS (JSC)	-75
REESTIMATE EXTERNAL TANK OPERATIONS/RATES	-70
REDUCE MISSION OPERATION DIRECTORATE/JSC FACILITY UPGRADES	-59
REBASELINE ALTERNATE TURBOPUMP DEVELOPMENT, ENGINE HARDWARE	-50
DELETE REACTION CONTROL SYSTEM DIRECT ACTING VALVE	-50
DELETE LIGHTWEIGHT BOOSTERS	-41
FACILITY CONSTRUCTION NOT REALIZED	-39
REDUCE DEFENSE CONTRACTS MANAGEMENT COMMAND SUPPORT	-37
REDUCE PROPULSION SYSTEM INTEGRATION	-37
DELETE FLIGHT SUPPORT MOTOR's	-35
DELETE ENGINE HEALTH MONITORING (EXC. THERMOCOUPLES)	-34
REDUCE EXTENDED LIFE FUEL CELLS	-8
DELETE NOZZLE EXTENSION	-4
OTHER REESTIMATES	-142
OTHER RESTRUCTURING	-359
TOTAL FWR/RESTRUCTURE CHANGES:	-2,736

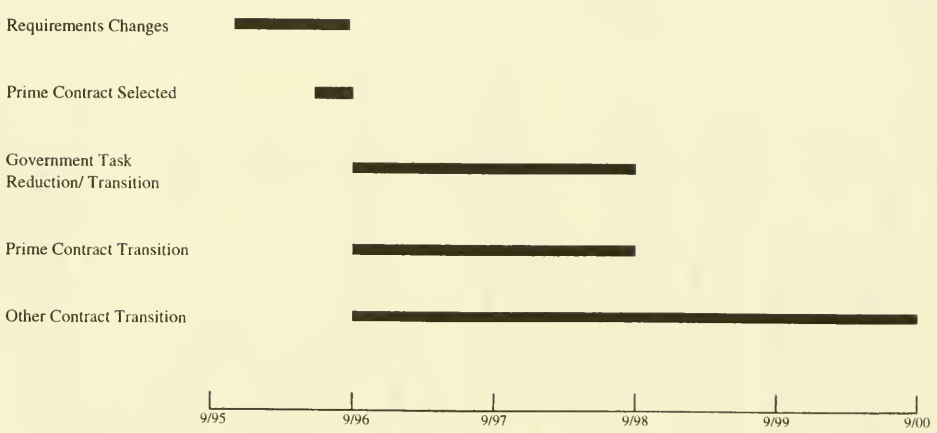
HOWEVER, WE ALSO HAD SOME ADDITIONAL REQUIREMENTS SINCE THAT TIME SUCH AS:	
OTHER PROGRAMMATIC CHANGES:	221
DIRECTED CONTINGENCY PROVISION	100
EXTEND A-2 TEST STAND TESTING	5
REESTIMATE SAFER PRODUCTION	15
REESTIMATE SUPER LIGHTWEIGHT TANK	6
SRB FORWARD SKIRT REPLACEMENT	48
SPEED/FLOW PRESSURE SENSORS	21
LAUNCH & LANDING REQUIREMENTS	26

Note: The reductions for these items are current estimates and subject to change.

Attachment 5

TRANSITION

A Carefully Planned and Controlled Transition is Essential.



Timeframe for Transition

Attachment 6

PRELIMINARY

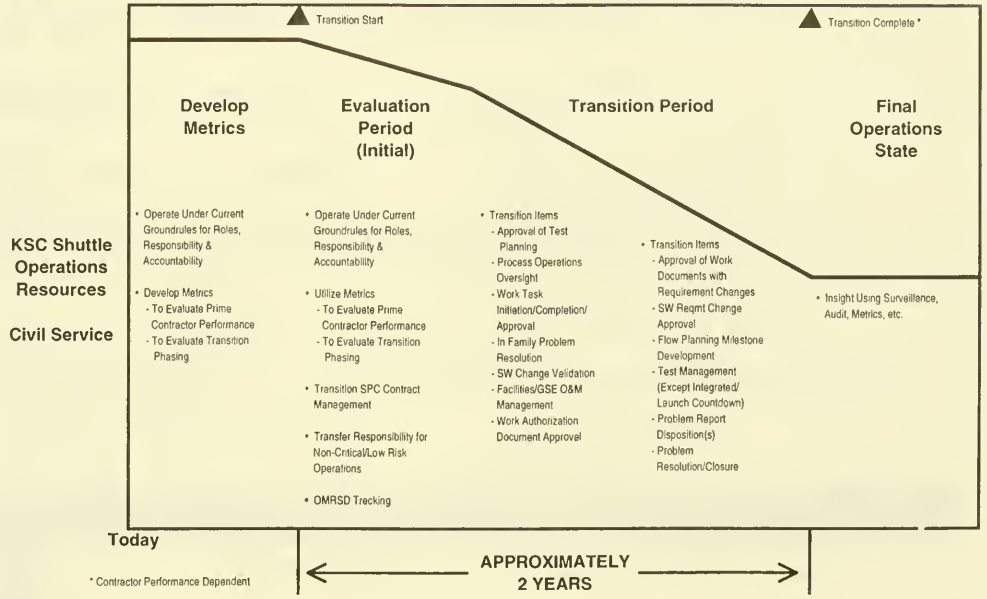
Organization — Shuttle Operations - TM

Task/Activity Today	FTE	Task/Activity Transition Complete	FTE
Processing Activity • Requirements Management - Review, Assess and Approve Requirements Change, OMRSD, PRD, Drawings, Etc. • Work Acceptance - 100% Inspection Using Approval - Schedules, Work Documents, Software, Task Execution, Problem Resolution, Etc.	316	**Processing Activity** • Requirements Management - Review, Audit and Surveillance • Work Acceptance - Review, Audit, Surveillance, Metrics and Process Analysis - Exceptions: Launch Execution, High Risk Systems, and Out-of-Family Problem Resolution	170
Ground System Sustaining Engineering • Design Responsibilities - Develop Modifications, Upgrades, Obsolescence, Etc. - Approve Development and Validation of Ground Software - Assess for Standards Compliance and S/W Safety Analysis	103	**Ground System Sustaining Engineering** • Design Responsibilities - Develop Modification Upgrades, Obsolescence, Etc. - Approve Requirements - Surveillance of S/W Development - Perform S/W Safety Analysis on High Risk Systems	60
New Development • Development of New GSE and Technologies for Performance Enhancement	37	**New Development** • Transferred to Center Support	0
Project Management • Budget, Contract, Program Office Delegated Functions • Contractor Reallocations	61	**Project Management** • Transferred to Program - Exception: Delegated Program Office Responsibilities, KSC/Launch Management • Transferred to Contractor	20
	517		250

Attachment 7

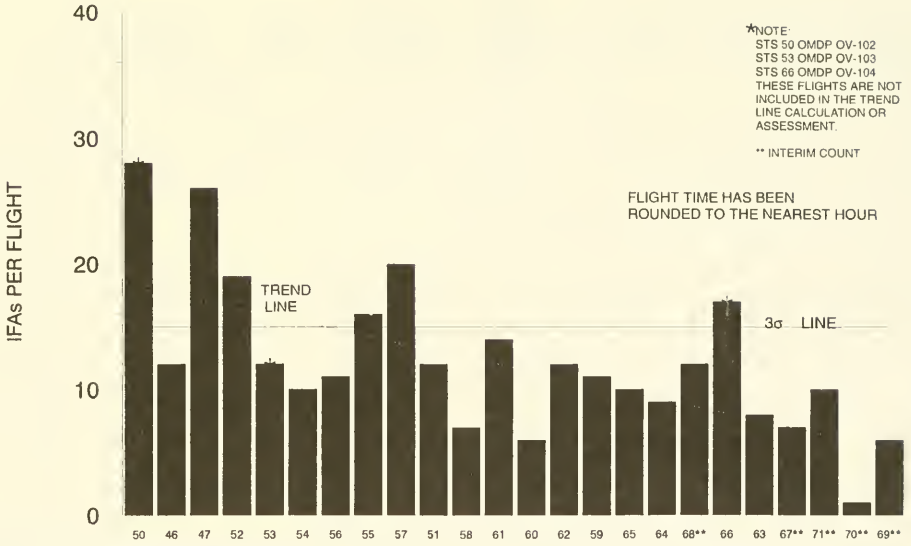
PRELIMINARY

KSC - Shuttle Operations Transition



Attachment 8

IN-FLIGHT ANOMALIES

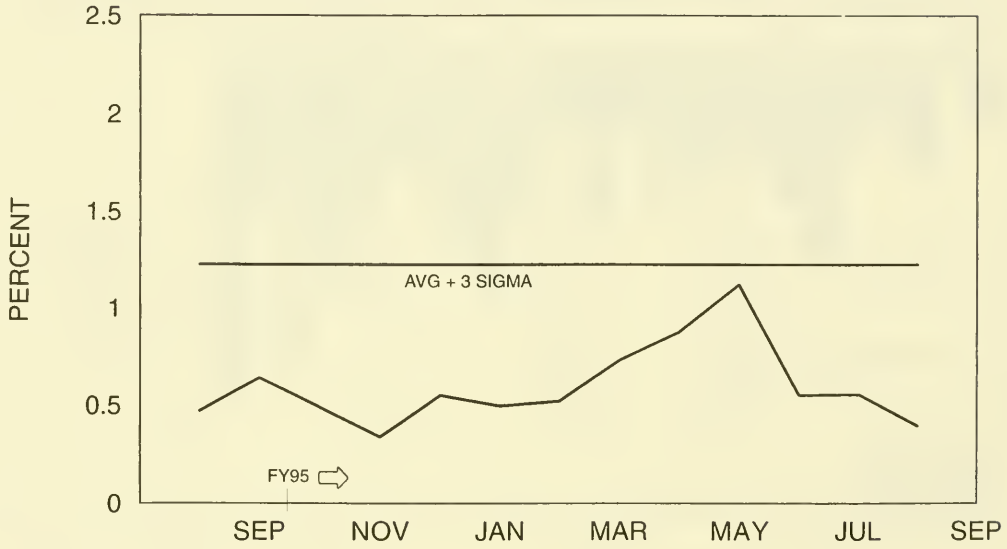


	50	46	47	52	53	54	56	55	57	51	58	61	60	62	59	65	64	68**	66	63	67**	71**	70**	69**
IFAs	28	12	26	19	12	10	11	16	20	12	7	14	6	12	11	10	9	12	17	8	7	10	1	6
HOURS IN FLIGHT	331	191	190	237	175	144	222	240	240	236	336	206	199	335	270	354	263	270	263	198	399	235	214	260
PROCESS INDUCED	1	0	0	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Attachment 9

KSC ERROR RATE

(PER QUALITY SURVEILLANCE)



Attachment 10

Mr. SENSENBRENNER. Dr. Littles, one of the things that we must understand before going any further with the sole-source single prime contract is how we have done up until now in cutting the Space Shuttle's operational budget.

Between fiscal year 1992 and through the end of fiscal year 1995, how much in dollars and how much in percentage have you managed to cut out of Space Shuttle operations?

Mr. LITTLES. We have reduced, as I mentioned earlier, the program by about a billion dollars. Some of that, as I indicated earlier, was in content, and some of it was in improving efficiency and procedures.

I can give you the data on the dollar values of the contract content that we've taken out and the dollar value of the other areas.

I do not have that with me, but I will give it to you for the record.

Mr. SENSENBRENNER. Do you have any figures relative to the dollar value of operations?

Mr. LITTLES. I do not have that off the top of my head, but I can get it.

Mr. SENSENBRENNER. Will you please supply that to the Committee.

Mr. LITTLES. Yes, sir.

[The following information was received for the record:]

SPACE SHUTTLE BUDGET COMPARISON
FY 1992 TO FY 1995
(NOA, RY $'s in M's)

12/6/95

	FY 1992	FY 1993	FY 1994	FY 1995	FY92-95 DELTA
SPACE SHUTTLE:					
SHUTTLE OPERATIONS	2821.8	2871.5	2549	2415.3	**-406.5**
SAFETY/PERFORMANCE UPGRADES	1383.4	1172.6	1009.7	739.8	**-643.6**
TOTAL	4205.2	4044.1	3558.7	3155.1	**-1050.1**

Note: FY 1992-93 have been revised to reflect new Space Shuttle budget structure initiated with the FY 1995 budget to Congress.

Mr. SENSENBRENNER. I would like to ask if these cuts have been hard-dollar cuts, or whether they were based on actions that were planned in baseline during the period between 1992 and 1995, inclusive? I think that you can answer "yes" or "no."

Mr. LITTLES. Yes, they were cuts that were very carefully planned and put into the budget and assessed as we were going through that; yes, sir.

Mr. SENSENBRENNER. Now are these hard-dollar cuts?

You do have the chart that said it went from $4 billion to about $3 billion a year.

Mr. LITTLES. Yes, sir. The budget in 1992 was about $4.2 billion as I recall, and in 1995 it was $3.2 billion. Yes, sir.

Mr. SENSENBRENNER. Now have these cuts been accomplished fully? Or are they being carried into fiscal year 1996 and beyond as management challenge or unresolved reductions? And how much of the challenge are we carrying forward into 1996?

Mr. LITTLES. Those cuts that I just mentioned, the $4.2 billion down to the $3.2 billion in 1995, are hard cuts. What I showed in the chart, it showed—the budget profile showed the bottom line budget that you will see later when it is submitted, and the content for those reductions are reflected in one of the attachments in the written hearing.

What I have provided there is a list of the things that we have assessed to be changed between 1996 and 2000. So that is there for the record. It shows you where all those changes were being made.

You will see in there that——

Mr. SENSENBRENNER. Yes. Now Attachment No. 4 lists Unresolved Items for each of the next five fiscal years which amount to over a billion and a half dollars. So I guess, you know, my question is. With this unresolved, are we talking about real-dollar cuts? Or are we talking about funny money?

Mr. LITTLES. No, sir. Those are not—let me explain.

When we submitted that budget, what you see there in the unresolved 1996 budget line, those were unresolved at that point in time.

In addition to that, we took the addition $1 billion. But I have identified where all those cuts will come, and that is provided in—and I do not have the chart in front of me—it is on Attachment No. 5 in the written testimony.

What that attachment does it summarize at the top the budget change between 1996 and the year 2000. In the middle there you will see how we have taken the reductions that add up to the $2.615 billion.

The reductions that I have identified there actually add up to $2.7 billion, but you will see at the bottom there we have actually increased the content by about $220 million. So that is the $2.5 billion.

If you look down through that list, what you will see is specific items identified. It starts off with the functional work force review. As I indicated earlier, we identified there about 3100, as I recall, additional positions over time that could be reduced. That is reflected in that $1 billion reduction over that runout period of time.

Then I have listed there all the other places where we are taking content out. You will see the bottom item there where it says

"other restructuring, $360 million." That is the only part of the $2.5 billion reduction which is not specifically tagged to an item, and we assess that we can get that much additional reduction over that five-year period of time as a result of the contract restructuring.

Mr. SENSENBRENNER. Now during the years of cost reduction, how has NASA monitored safety issues, aside from the graph that you submitted to us relative to the number of inflight anomalies? And do you have a system that can assess whether the reductions in both contractor and civil service work force have impacted safety?

Mr. LITTLES. As I indicated, we have a set of metrics here, and that was just an example of one that we looked at at Headquarters. Each of the projects, the manufacturing plant, and KSC has a detailed set of metrics where they have indicators and track the work performed and how the work is going. In addition to that, we very carefully review and audit the work that is going on. We go through the processes to make sure the processes are still valid.

We have periodic looks to see that the processes are being followed. We make sure that the training the people have had, or are supposed to have, is there. So we have a structured program to make sure that the work that is supposed to be done, that the hardware is being built by design and that we are following process.

Mr. SENSENBRENNER. Have there been any metrics or measures that have gone the wrong way since the belt-tightening began?

Mr. LITTLES. I have not seen any metrics that have gone the wrong way.

Mr. SENSENBRENNER. Measures, too?

Mr. LITTLES. No. No. Everything is being maintained. I have not seen any metric that indicates that we have any problem. And I can provide to you for the record, if you like, additional metrics that we use.

Mr. SENSENBRENNER. I would appreciate that, too.

[The following information was received for the record:]

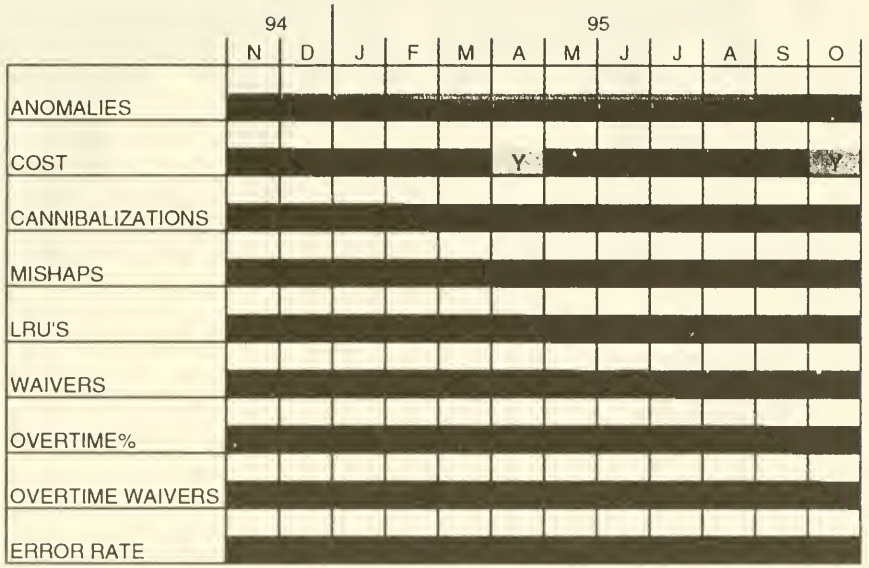
Office of Space Flight

SHUTTLE PROGRAM DIRECTOR'S METRICS

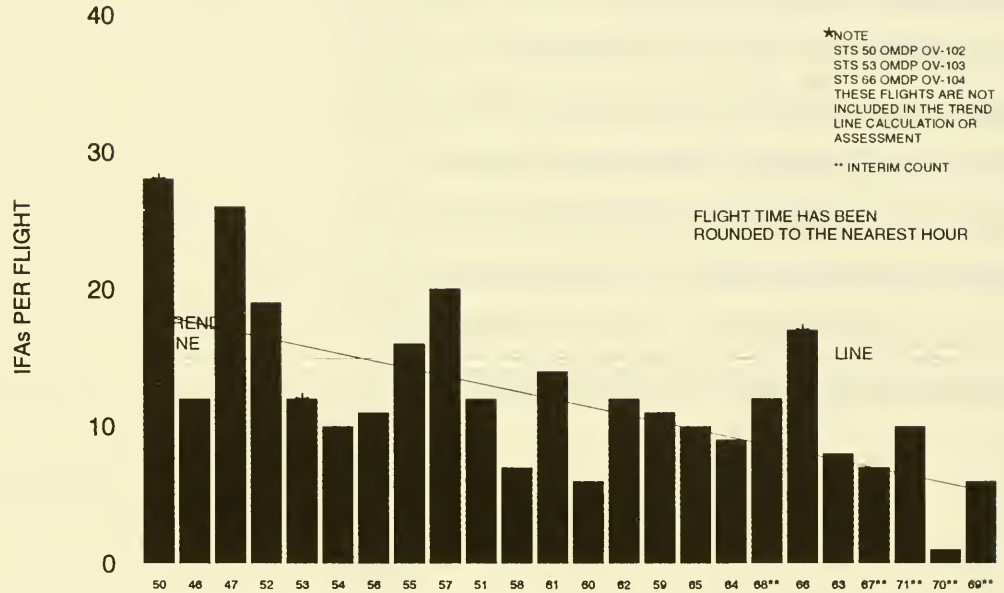
OCTOBER, 1995

METRIC	STATUS
(1) IN-FLIGHT ANOMALIES	
(2) SPACE SHUTTLE MONTHLY COST RATE	
(3) ON-TIME DELIVERY AND CANNIBALIZATIONS	
(4) KSC MONTHLY MISHAPS	
(5) ORBITER SYSTEMS & LRU PROBLEM REPORTS	
(6) OMRSD WAIVERS AND EXCEPTIONS	
(7) SPC OVERTIME PERCENT	
(8) SPC OVERTIME WAIVERS	
(9) KSC ERROR RATE (PER QUALITY SURVEILLANCE)	

METRIC HISTORY



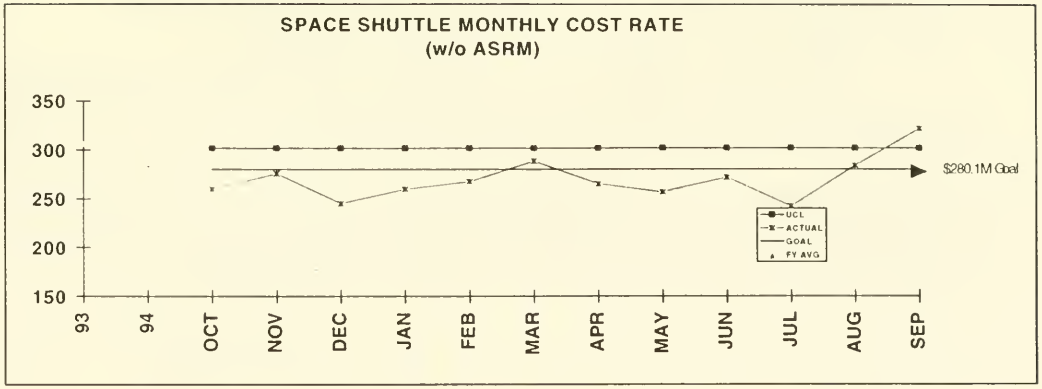
IN-FLIGHT ANOMALIES



	50	48	47	52	53	54	56	55	57	51	58	61	60	62	59	65	64	68**	66	63	67**	71**	70**	69**
IFAs	28	12	26	19	12	10	11	16	20	12	7	14	6	12	11	10	9	12	17	8	7	10	1	6
HOURS IN FLIGHT	331	191	190	237	175	144	222	240	240	236	336	206	199	335	270	354	263	270	263	198	399	235	214	260
PROCESS INDUCED	1	0	0	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DATA SOURCE LSOC TEST PROJECT ENGINEERING
D HENSON 861-4356

METRIC 1



$Millions	FY93 AVG	FY94 AVG	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
UCL			$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00	$302.00
ACTUAL	$305.90	$284.70	$260.10	$275.70	$245.30	$259.90	$267.70	$288.80	$265.20	$257.00	$271.80	$242.30	$284.20	$321.90
ACCT DAYS			20	18	19	20	20	24	21	20	22	21	23	21
DAILY RATE			$13.01	$15.32	$12.91	$13.00	$13.39	$12.03	$12.63	$12.85	$12.35	$11.54	$12.36	$15.33

REQ'D* MONTHLY
287.6

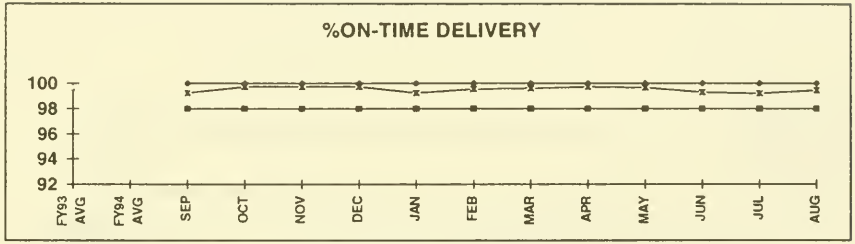
UCL = 5% OVER EST MONTHLY EXPENDITURE

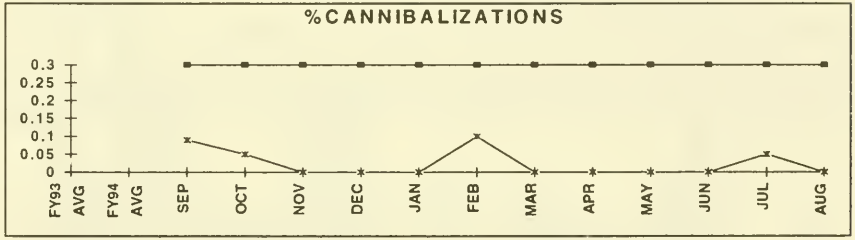
*Required monthly is average monthly spending required to meet Operating Plan

MONTHLY GOAL
280.1

Monthly Goal is average monthly spending required to meet $90M underrun for FY-95

METHC 2



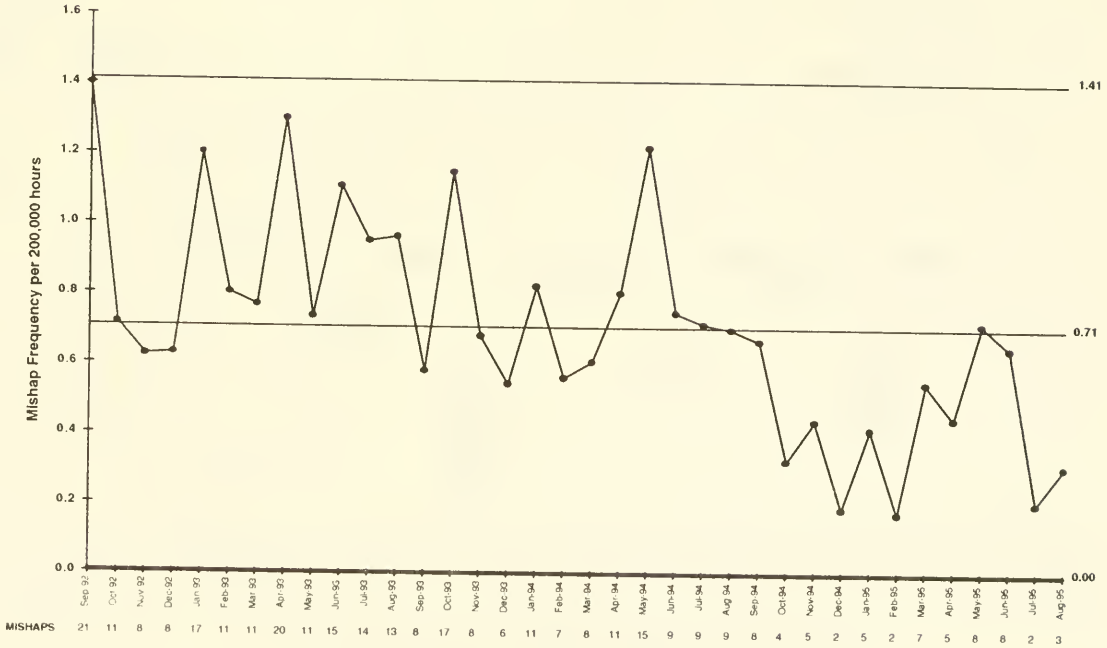


	FY93	FY94	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
UCL			100	100	100	100	100	100	100	100	100	100	100	100
%ONTIME DELIVERY	99.6	99.49	99.25	99.73	99.75	99.72	99.26	99.55	99.60	99.73	99.69	99.30	99.21	99.46
LCL			98	98	98	98	98	98	98	98	98	98	98	98
TOTAL ITEMS			2122	1838	1994	1450	2039	2011	2252	2244	2622	1862	1897	2571
			SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
UCL			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
% CANN	0.03	0.04	0.09	0.05	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.05	0.00
# CANNIBALIZATIONS			2	1	0	0	0	2	0	0	0	0	1	0

DATA SOURCE RIC LOGISTICS

METRIC 3

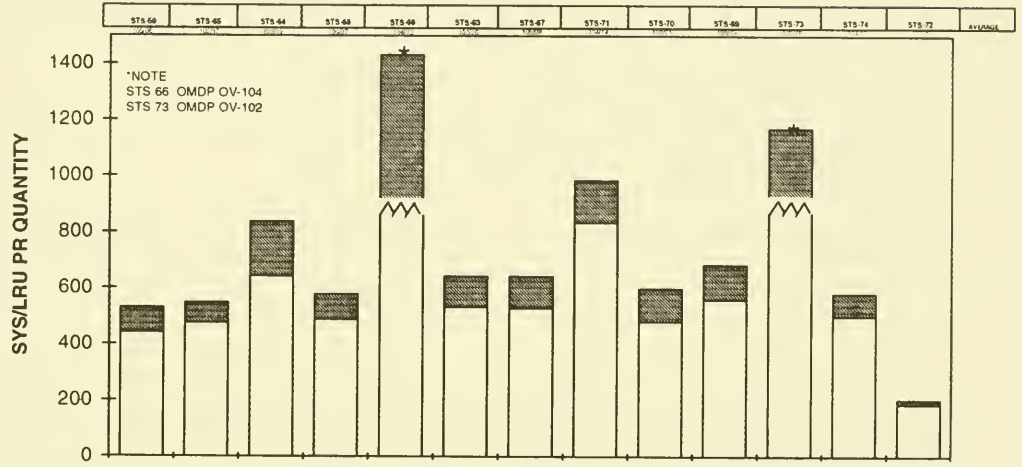
KSC MONTHLY MISHAP FREQUENCIES (EXCLUDING CLOSE CALLS)



METRIC 4

MAINTENANCE TREND ANALYSIS REPORT
ORBITER SYSTEMS & LRU PROBLEM REPORTS (PR'S) GENERATED

PR-1



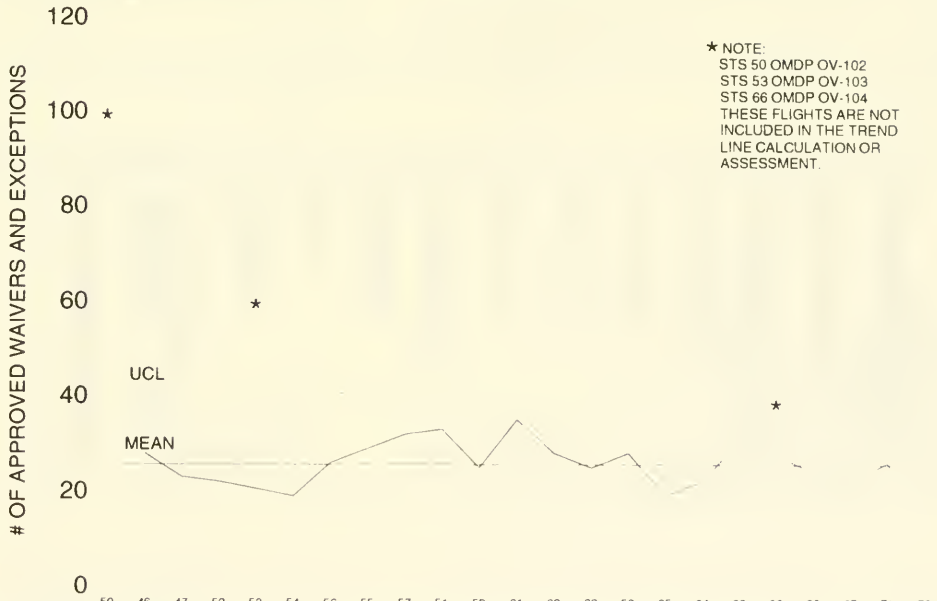
	STS-50	STS-65	STS-44	STS-68	STS-66	STS-63	STS-67	STS-71	STS-70	STS-69	STS-73	STS-74	STS-72	AVERAGE
SYS PR'S	441	476	641	488	3880	534	530	834	482	559	* 2494	* 501	* 186	554
LRU PR'S	90	72	195	90	531	110	113	151	117	125	* 270	* 80	* 17	118
TOTAL	531	548	836	578	4411	644	643	985	599	684	* 2764	* 581	* 203	672
OPF WORKDAYS	67	62	125	59	110	71	81	115	63	81				

NOTES
1. * = INTERIM FLOW COUNT (AS OF 10-05-95).
2. DOES NOT INCLUDE TILE PR'S; REFER TO CHART TR-1 FOR TILE REPLACEMENTS.
3. STS-66 (OV-104/FLT 13) & STS-73 (OV-102/FLT 18) AND INTERIM FLOW QUANTITIES PURPOSELY OMITTED FROM FLOW AVERAGE CALCULATIONS.

DATA SOURCE: PRACA/LMSO SUPPORTABILITY ANALYSIS

METRIC 5

APPROVED OMRS WAIVERS AND EXCEPTIONS
PER FLOW

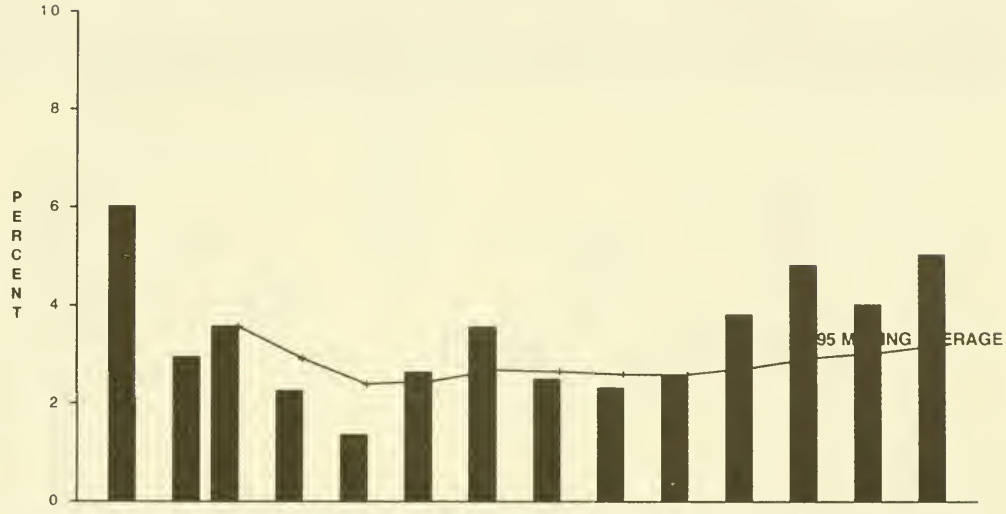


	50	46	47	52	53	54	56	55	57	51	58	61	60	62	59	65	64	68	66	63	67	71	70	69
WAIVERS/EXCEPTIONS	97	28	23	22	57	19	26	29	32	33	25	35	28	25	28	19	22	31	36	24	22	26	15	29
ORBITER	90	20	17	22	55	18	18	19	22	19	21	25	22	21	22	17	17	25	33	21	21	19	12	22
ET	1	0	1	0	0	0	0	0	1	2	0	0	0	2	0	0	0	1	0	0	0	0	0	1
SRB	0	0	2	0	1	1	3	4	3	5	2	2	0	1	0	0	1	0	1	0	1	0	1	2
INTEGRATED	6	8	3	0	1	0	5	6	6	7	2	8	6	1	6	2	4	5	2	3	2	7	2	4

DATA SOURCE LMSO FLIGHT REQUIREMENTS
H FISHER 861-0869

METRIC 6

SPC Overtime Percent



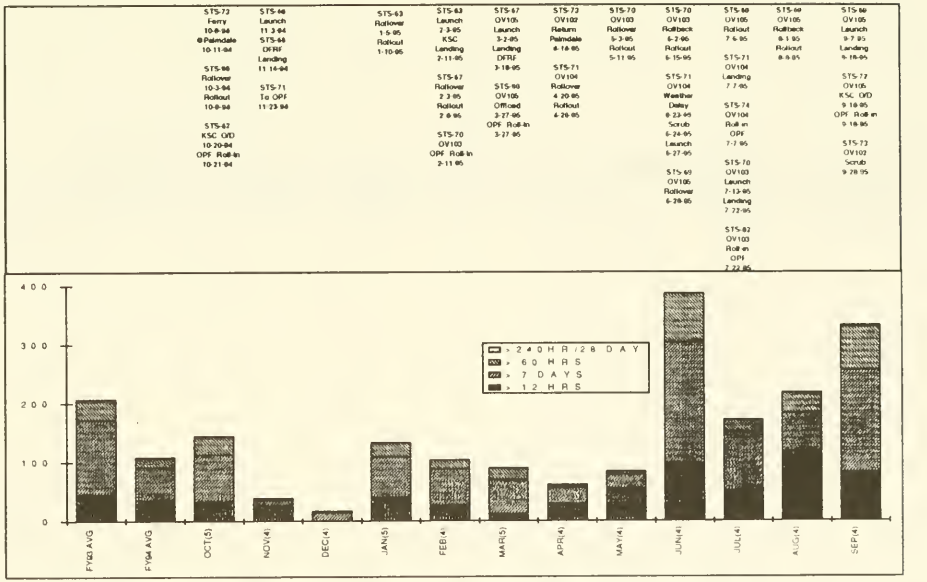
FY94 (#ACCT WKS)	FY93 AVG	FY94 AVG	OCT(5)	NOV(4)	DEC(4)	JAN(5)	FEB(4)	MAR (5)	APR(4)	MAY(4)	JUN(4)	JUL(4)	AUG(4)	SEP(4)
SPC OT%	6.02	2.94	3.57	2.25	1.35	2.62	3.55	2.48	2.31	2.58	3.81	4.82	4.01	5.03

"This document contains trade secrets and commercial or financial information that is privileged or confidential The disclosure of such information is prohibited under the Freedom of Information Act (5 U.S.C. § 552) and other statute(s) prohibiting disclosure (e.g 18 U.S C. § 1905)."

Data Monthly Source: 533M (WBS 1.0 + 3.0)

Date 10 October 1995
Prepared by: Program Coordination 7-7013
(Numbers are Rounded)

SPC OVERTIME WAIVERS

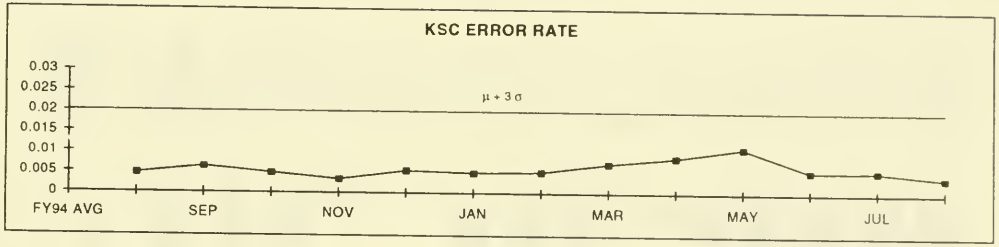


	FY93 AVG	FY94 AVG	OCT(5)	NOV(4)	DEC(4)	JAN(5)	FEB(4)	MAR(5)	APR(4)	MAY(4)	JUN(4)	JUL(4)	AUG(4)	SEP(4)
> 12 HRS	44.83	35.25	32	27	0	40	26	12	29	55	97	51	116	82
> 7 DAYS	127.16	56.08	81	8	14	69	62	58	27	23	205	100	67	174
> 60 HRS	34.83	16	31	4	3	24	16	20	6	6	84	21	35	74
>240HR/28 DAY	0.16	1.25	0	0	0	0	0	0	0	0	0	0	0	2

Date 10 October 1995
Prepared by: Program Coordination 7-7013

METRIC 8

KSC ERROR RATE (PER QUALITY SURVEILLANCE)



		1994							1995					
	FY94 AVG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
ERROR RATE		0.004706	0.006387	0.004895	0.003392	0.0055	0.004963	0.005203	0.007293	0.008764	0.011203	0.005512	0.005542	0.003946
TOTAL ERRORS		102	138	85	55	75	97	91	103	150	133	92	75	60
OBSERVATIONS		21676	21605	17366	16215	13637	19545	17489	14124	17115	11872	16690	13532	15206

Mr. SENSENBRENNER. Now in the planning for the sole-source single prime contract, how do you plan to write provisions in that contract to correlate the cost reduction goals of the contract with the imperative for safety?

Mr. LITTLES. We expect to structure that contract with several things in mind.

First of all, we are going to have a fee structure in that contract that reflects our priorities in this program—which is safety, number one; meeting manifest, number two; and cutting costs, number three.

We are still going to have an award fee portion where we evaluate the performance of the contract relative to schedule, to safety, looking at metrics, and to the quality of the work that is done.

That will be a critical part of the fee determination for the contract. We will also have an incentive-fee feature.

Mr. SENSENBRENNER. So there will be an incentive fee and an award fee——

Mr. LITTLES. Yes, sir.

Mr. SENSENBRENNER. [continuing] that will each be tied to safety?

Mr. LITTLES. Yes, sir. As a matter of fact, there will be a gate. The contractor will not be able to get any incentive fee if he does not perform to a certain level on the award-fee portion. That level is to be determined yet during negotiations, but we expect it to be very high.

Mr. SENSENBRENNER. Now do you intend to hold the contractor accountable for inflight anomalies and other system failures?

Mr. LITTLES. Yes, sir. We will hold them responsible for that through the performance evaluation.

Mr. SENSENBRENNER. And if there is an anomaly that will require the grounding of the fleet, and there have been a couple of those in the last two years, will there be requirements in the contract on a speedy effort to get the fleet back up and going?

My feeling is that if there is not that kind of incentive, the schedule that we have got for assembling the Station ends up getting tossed in the waste basket.

Mr. LITTLES. Well, again, we will do it through the fee structure. Depending on the magnitude of the problem, there will also be provisions in the contract for cost penalties.

Another thing that we are going to incorporate into this contract, by the way, is a look-back feature so that we, after a period of time—and right now we are thinking about 30 months—we look back over the performance of the contract to make sure it was doing what we thought we were doing when we did the periodic evaluations.

Mr. SENSENBRENNER. Okay. As you know, this subcommittee has been hot on negative award fees. Is that going to be in the contract, too?

Mr. LITTLES. We do not have negative award fees, but we do have that look-back provision where we can take-back. In that respect we have a negative award fee.

But if we look back and find that we were too generous and there were things that we did not see, then we will have a capability to remove some of the fee that was given to the contractor.

Mr. SENSENBRENNER. That concludes my questions.

The gentleman from Alabama, Mr. Cramer.

Mr. CRAMER. Thank you, Mr. Chairman.

Dr. Littles, I want to direct you more toward the scope of the prime contract. When will NASA provide a statement of work and let us know how broad this contract will be?

Mr. LITTLES. That scope of work will be available within the next two weeks. We are going through the final polishing of it right now, incorporating comments into it. It will not be finalized—it will be available for anybody to look at—it will not be finalized until we review it with the contractor and make sure that we and the contractor understand the work to be done.

We expect that to be done by the end of the year. So we expect a finalized scope of work and request for proposal by January.

Mr. CRAMER. When do you think the contract will be finally negotiated?

Mr. LITTLES. I expect that it is going to be sometime in the August-September time frame. It depends on how tough the negotiations are.

We expect to have a proposal from the contractor by March. We will spend a few weeks evaluating it, and after that we will get into negotiations.

Mr. CRAMER. Well I certainly hope you have a contingency plan if that time frame shifts, because with the sole sourcing on Space Station we had considerably more time than NASA expected that went by before we finally had that contract negotiated.

Mr. LITTLES. Yes, I understand that. But when it gets to the point of negotiations, you know, you have to get the job done right from the government standpoint and that was the difficulty in the Space Station. It just took awhile to negotiate it.

I believe, though, that with this being an operational program, the work already being in progress, this contractor having a large part of that work already, I believe we can do it in this time frame.

Mr. CRAMER. Are you planning to include any Space Station operations in the contract?

Mr. LITTLES. The only thing that is in this contract that relates to Space Station operations is a contract at JSC, which is a contract for flight and mission operations and flight planning.

It is a contract that is held by the Mission Operations Division there. It is a Rockwell contract in that it includes that kind of work for both Space Station and Shuttle.

There were originally two contracts. Rockwell won the Space Station work competitively, and some time ago—I believe it was the summer before last, because it was already done before I came into this position—the decision was made to consolidate those two contracts and to operate Space Station and Shuttle out of the same control center.

There were considerable efficiencies gained in doing that. There was a lot of money saved. I do not have the numbers, but I can get it. But that decision was made a long time ago.

Now the Space Station program uses that contract to do its operations. It provides requirements to that contractor. It provides tasks orders to the contractor. So the Space Station program is in complete control of that activity.

It is not—and it will be, still, even though that contract will be folded into this other—the Space Station Program Office will still be in control of operations.

Mr. CRAMER. With regard to the scope of the contract, as you look down the line could decisions be made that would consolidate work that might have been done at Marshal, at Johnson, or work that was done at Johnson at Marshal, or concerning any of the other centers? Do you anticipate any of that that will be put on the table with this consolidation?

Mr. LITTLES. I do not really see any significant change of work between centers.

What we are doing fundamentally is decreasing the scope of the government work at all three centers, but I do not see any work content actually migrating from one place to the other.

Mr. CRAMER. Or any other missions that might be altered by what you have to look at in the scope under this contract?

Mr. LITTLES. At this point in time, I do not see that. Now there—you know, one of the things we will be doing in a few years is commercializing some of the activities associated with Space Station utilization and integration, and those kinds of things, and there may be some shifts when we do that. But that is several years downstream. Probably not until assembly is complete.

Mr. CRAMER. How vulnerable might this contract be to protests based on it being awarded on a noncompetitive basis?

Mr. LITTLES. Well there is always that possibility, but I believe we have a sound justification for what we are doing. Again, it is primarily we feel a schedule risk if we had a new management team and a new set of workers coming in to do this work at the same time we are trying to meet the very ambitious schedule to the first Space Station launch. So it is a schedule risk, and we think there is a sound justification for it.

Mr. CRAMER. Thank you, Dr. Littles. I yield back my time.

Mr. SENSENBRENNER. The gentleman from Florida, Dr. Weldon.

Mr. WELDON of Florida. I thank the Chairman.

Before I get into my questions, I would just like to ask Dr. Littles if he would again be willing to answer the questions from the anonymous Home Depot FAX Machine outside of Kennedy Space Center? At our last hearing we received a list of questions from presumably Kennedy Space Center personnel, and they have again sent a list of questions to us and I would like to submit these to the record and ask you if you could review them and get back to us regarding them?

Mr. LITTLES. We will certainly do that, yes, sir.

Mr. WELDON of Florida. I appreciate that.

On page 9 of your testimony you state that "The NASA program manager is developing the program management plan which outlines the relationship between government and contractor, safety and mission assurance organizations, center support organizations, and Shuttle and Space Station programs. Then it goes on to list ten major areas of consideration, including government and contractor roles, contract management, including performance evaluation, certificate of flight readiness, Shuttle requirements, management, government organizational structure.

You state that this plan is to be completed in January of 1996; correct?

Mr. LITTLES. Yes, sir.

Mr. WELDON of Florida. My question is, this list covers virtually every aspect of the program. If these big questions have not been resolved, how can you make assumptions about the numbers of employees or employee reductions?

For example, in Attachment 7 of your written testimony you assume eliminating 267 jobs from Shuttle operations at Kennedy Space Center.

My question is: How can you do this, when your testimony indicates that the basic relationship between government and contractor have not been laid out? If that is the case, how did you come up with this figure?

Mr. LITTLES. We established several months ago a set of criteria to determine what types of work the government work force would continue to do, and what types of work the contractors would do.

Those criteria were given to the projects at all the centers, and it is that criteria that is being used to establish the changes in work force level.

So those criteria have been developed, and they are being used. And fundamentally it is very straightforward. What we are saying is, if there is an operational task, a task that we judge to be operational and we have government work force either doing that, or they are doing day-to-day management of it, then we would like to back off from that.

If it is an activity that we feel is a safety- critical activity that we will need to be monitoring and looking at, we will keep that task.

If it is a task related to design or development, we will keep those. But we have those criteria that were given to the projects, and they are going through that in detail and the product that I showed from KSC is one organization's cut at that.

So those kinds of things were established early on. Now when we get the contractor on board, of course we will have to go through that and make sure that what we have assumed is what he has assumed. We will have to have a very detailed plan for doing that. So that is work to be done.

But we understand how we expect to back away, and that is being flowed into the activity we have to define the contract, and it is being flowed into the transition plans that we are developing.

The number that you mentioned—could you tell me where that is? I've forgotten.

Mr. WELDON of Florida. Attachment No. 7.

Mr. LITTLES. Oh, okay. Yes. That is the product that came out of that organization based on those criteria. This is just one of the organizations at KSC, and I have this kind of data for the rest of KSC, as well as other centers that shows where the status is.

What they have done here is, on the left what you see there is what they are doing today. On the right is their assessment based on the criteria that they were given. And this is the people and the projects doing the work.

That is their assessment of what they would be doing in the redefined program, and again their assessment of the work force levels. So that is their job. They have done it, themselves.

Mr. WELDON of Florida. Well, I remain concerned that this plan is placing a priority on meeting certain numbers' goals, and I am very concerned that this may compromise Shuttle safety.

I have had the opportunity to talk with many people throughout the program, both managers and folks on the floor, and many of them have expressed concern to me that there is a great pressure to meet certain personnel numbers; and that the question that some of these people are raising questions about safety are not going fully answered.

I see my time has expired, so I will submit additional questions to you in writing.

Thank you.

Mr. SENSENBRENNER. The gentleman from Indiana, Mr. Roemer.

Mr. ROEMER. Thank you, Mr. Chairman.

Dr. Littles, the Chairman had asked you to come back up here because we had not received sufficient verbal responses to some of the questions we asked you previously when you came up to testify.

I had submitted a number of questions, eight or nine questions, with respect to Shuttle safety. It is 43 days later. I still do not have any answers to these questions, and I wondered if there is a reason for that?

Mr. LITTLES. I am surprised.

Mr. ROEMER. I am surprised, too. Usually NASA is very good at getting back to me.

Mr. LITTLES. We have responded to several sets of questions.

[Pause.]

I am sorry. We will have to check on that, because we did get several sets of questions and we responded to those, and if we have somehow misplaced yours I apologize and we will take care of it right away.

Mr. ROEMER. Okay. Well I appreciate that. This is the Oversight Committee, and I would hope that Members of the Committee, whether they are Democrats or Republicans, would get a timely answer to safety questions.

Mr. LITTLES. It is our intent to do that.

Mr. ROEMER. Let me ask a question with respect to some of the numbers on Shuttle safety.

This is relating to both your testimony and this latest AP Wire Story out of Houston. It appears that the number of civil servants and contractors working on the Shuttle will go from 35,000 to 28,000 by the year 1995, and then down to 20,000 by the year 2000.

In the same period, there is going to be a $1.7 billion cut in the Shuttle budget.

I have very, very deep concerns about the Shuttle safety with these kind of numerically driven solutions to the problem here. I am certain that there were probably some redundancies that were mandated in the Rogers Commission, in their recommendations.

Can you give me some assurances here with respect to the relative weights that you are going to assign to the three variables

that you outline in your testimony. safety, cutting costs, and meeting schedules?

Mr. LITTLES. Well, safety is not only the number one priority, it supercedes the other two. We will not do anything that compromises safety.

Now relative to those reductions on that chart attached—well, as a matter of fact, that chart was not attached, and we will provide that for the record, by the way—that was not in the written testimony—the reductions you see there going from 1996 through the year 2000, that Attachment No. 5 I mentioned a minute ago outlines where we expect to get all those reductions.

We have looked at all those areas. Of that total of $2.5 billion, $1 billion of that—and I am talking about the runout budget now with that five-year period of time—$1 billion of that was carefully assessed by these 13 Function of Work Force Teams that I reviewed.

They reviewed the total program to make sure that everything was safe; we still had the people required to do the job; and they found those additional reductions.

So that has been carefully assessed for safety.

[The chart referred to follows:]

SPACE SHUTTLE PROGRAM
WORKFORCE

	92	95	(ESTIMATE) 00
Contractors	31648	25707	19676
Civil Service	3832	3098	1604

REDUCTIONS

	Civil Service	Contractors	TOTAL
92-95	744	5941	6685
96-00	1347 (INITIAL ESTIMATE)	6031 (PRELIMINARY)	7378

Mr. ROEMER. So can you give me numerically, or assign a weight to safety rather than saying "safety is the highest priority?" How will you quantify that in terms of these three categories?

Mr. LITTLES. I am not sure I can do what you are asking, because if there is anything at all that we identify that has a safety risk, it will not be changed. We will add money back, if necessary. We are very clear on that, and the Administrator is very clear.

If I need money in this program because of safety, I can get it.

Mr. ROEMER. Okay. In terms of the single-source contract that Mr. Goldin announced the other day, were there talks ever undertaken with McDonnell Douglas, Boeing, BAMSI, and others, or was this just a decision made by——

Mr. LITTLES. Yes. What we did when we went through this process was, we announced in the Commerce Business Daily our intent to form this contract, and we asked for expressions of interest from contractors.

Based on that, McDonnell Douglas and Boeing and BAMSI and the U.S. Alliance submitted to us the data that we outlined as being required to express their interest and their capabilities.

That data was reviewed by our Source Evaluation Board. The contractors were brought in to have oral discussions with that board, and we have very carefully assessed all that material in coming to the conclusion that we reached.

Mr. ROEMER. Is the Alliance now a legal entity? And can you negotiate with them on these terms prior to them becoming a legal entity?

Mr. LITTLES. The Alliance, in my understanding, is in the process of forming that consortium or alliance. They have not done that yet. They obviously have to—that is the first step in this process.

They have to do that and become a legal entity obviously before we can sign a contract with them.

Mr. ROEMER. How long will that take?

Mr. LITTLES. I am hoping they do it quickly because--well they have expressed to the Administrator and to me at the highest level that it is their intent, and that they are going to do it.

Mr. ROEMER. Do you expect the Department of Justice to have any interest in looking at this as an antitrust case?

Mr. LITTLES. We have gotten a call. Just yesterday our legal department had a call from the FTC, and they have requested information on this.

We have a meeting set up on the 21st of November. We are going to go through with them our rationale and logic and where we are. So, yes, there is interest there and we are going to answer those questions.

Mr. ROEMER. What about Justice? My question pertained to Justice, rather than——

Mr. LITTLES. We have not heard from Justice. I thought the FTC would—my understanding was that sometimes it is the FTC and sometimes it is Justice that pursues these.

Mr. ROEMER. So you have had one and not the other at this point?

Mr. LITTLES. Yes. We have had the FTC and not Justice.

Mr. ROEMER. Finally, in terms of the Lockheed Martin Rockwell contract, this is 70 percent of the dollar value of the Shuttle contract.

How do we expect—or do we expect—how do we expect to get leverage in future negotiations with them as they lead up this path with stressing safety as the highest priority, but also meeting your other weights, cutting costs and meeting schedule?

Mr. LITTLES. Well, we expect to have leverage through the performance evaluation process. As indicated earlier, we have a look-back feature. So that is the way. We have to stress performance to them, and emphasize to them the necessity of meeting all of our requirements, which includes safety, and schedule, and meeting the manifests, and doing a total job.

Mr. SENSENBRENNER. The gentleman's time has expired.

The gentleman from California, Mr. Rohrabacher.

Mr. ROHRABACHER. Dr. Littles, I am trying to understand exactly what the relationship between the management of the Shuttle and the management of the Space Station is going to be. I have been a little perplexed in trying to understand how come these things seem to be being put together, and to what degree are they being put together?

Mr. LITTLES. Well, there is some confusion about that. That is our fault, I think. Some of the words we have used have confused the issue.

It is our intent, our plan—which of course will have to be approved by this Committee and others—but with time when we finish the assembly of the Space Station, what we envision is that we will have from the standpoint of the operation of the Space Station—now this is not the utilization of it; this is making sure the systems are running properly; the timelining of what goes on; the planning of that—we expect to have one unified, what we refer to as a "Space Flight Operations Office."

By that time we will have finished the development of Space Station. We will have finished the development of the Shuttle, and we will be operating Shuttle and Space Station.

So we envision that will come——

Mr. ROHRABACHER. I'm sorry? When do you think this will, did you mention what year you think this will be?

Mr. LITTLES. This will be after assembly is complete.

Mr. ROHRABACHER. That is what year?

Mr. LITTLES. 2002.

Mr. ROHRABACHER. Okay.

Mr. LITTLES. Now what we have done to this point in time is, as I indicated earlier, there is one contract at the Johnson Space Center which the Mission Operation Directorate uses to do their flight planning and flight operations work, which is a Rockwell contract, which some time ago was combined.

There were two Rockwell contracts and they were combined into one. Rockwell had won a contract from Space Station to do that work, and Rockwell had the contract for Shuttle. So for that activity in support of the Mission Operations Directorate at JSC, those two contracts were put together and we will be operating Space Station and Shuttle out of the same Mission Control Center.

To that point in time, that is the extent of involvement of this contract that we are consolidating in Space Station operations.

There are probably a few additional—and we are going to provide the detail of this to the Committee and staff——

Mr. ROHRABACHER. So what you envision is that once Station is assembled that you will have basically one organization overseeing both the Shuttle and the Station? Will that include repairing the Station and servicing the Station?

Mr. LITTLES. Yes, I envision that it would. At that point in time, the involvement for Space Station should be sustaining engineering, that engineering that is required to support Mission Operations.

If there is any additional design work, of course that would not be done by this contractor. But we do envision that being pulled together, yes.

Mr. ROHRABACHER. Of course this is a long way away—Mr. Chairman, I believe that no matter what we are saying now or projecting now, between now and the year 2002 that we are going to find there a lot of different changes that will take place, and people will come up with various different plans.

Is this more just a theoretical type—it seems to me what we are talking about is theory here for the long run and not really laying something down in cement.

Mr. LITTLES. Well, that is where we would like to see it go, but certainly nothing is finalized or cast in concrete at this point in time.

Mr. ROHRABACHER. Quite frankly, my vision is different than that, but I think we are talking about a period that is far enough away that as these things progress we can talk about and reshape the game plan, because I really think that the Space Shuttle, frankly by the year 2002, the Space Shuttle is going to be in a different era. It is going to be a whole different era.

The Space Shuttle is going to be something that was conceived of and technology put together for back in the 1960s, basically, and the early 1970s, and 2002 is a long way away from now, even.

So my concept, and I will just leave it at that, Mr. Chairman, is that we should not see such a coupling of Station and the Shuttle, and that instead of having the servicing of the Station and such being centralized into one force, we should basically look for contracting out for such services.

I am sure there are a lot of private companies that would want to do some of these things, but as I say I do not think it is worth really getting into a ruckus about today.

Thank you very much.

Mr. SENSENBRENNER. The gentleman's time has expired.

Let me say that we will have a second round of questions, and I will call on the Members in the order for the second round that I called on them for the first round. However, when the bell rings for the next vote, this hearing will be adjourned.

I only have two questions for my shot on the second round.

Dr. Littles, as you begin negotiations with United Space Alliance, is there anything that is off limits as a subject for negotiation?

Mr. LITTLES. Within the context of the program, I do not believe there is anything that is off limits. What we are asking in our re-

quest for proposal is that the contractor propose to us how he would do this consolidation, and how he would do this program more efficiently if he has ideas to do that.

So there is nothing I know of within the context of the program and the things that we are putting under it that are off-limits. We do expect them to come back and tell us how to do the job.

Mr. SENSENBRENNER. Now does this mean that as a part of this contract there will be a contract for operations of the Space Station both until assembly is complete and after assembly is complete within the single prime contract?

Mr. LITTLES. No. Again, the only thing that is going in this contract relative to Space Station is that contract that I mentioned, the Rockwell contract at JSC.

Now there are probably some peripheral things that are currently done by institutional contracts as a service for Station that may get in there, but we are pulling all that together and we will show you that. But it is small things.

Mr. SENSENBRENNER. Okay. Can you give us assurance, Dr. Littles, that there will not be a general contract for the operation of the Space Station included in this single prime contract for Shuttle operations?

Mr. LITTLES. No. Again, the only thing that is in there is that contract. If there is anything else, I will find it and tell you about it, but I am not aware of anything else in there.

Mr. SENSENBRENNER. Thank you.

The gentleman from Alabama, Mr. Cramer.

Mr. CRAMER. Quickly, Mr. Chairman.

How does the agency anticipate distributing risk between the government and the contractor in this contract?

Mr. LITTLES. Again, what we expect to do with the contract is to define very clearly those responsibilities that we expect the contractor to have. And by pulling this contract together and consolidating it, we expect him to take more responsibility and accountability for integrating the program.

He certainly will be responsible for continuing to assess program risk. But on the government side, we will continue to manage this contract, and we will use all the mechanisms that we currently use to understand what is going on to do our independent assessment of risk, to evaluate and assess issues, and to make sure that we understand on the government side risk in this program.

Mr. CRAMER. And I assume that will be made as clear as it can be made in the contract itself?

Mr. LITTLES. Yes, sir.

Mr. CRAMER. I have nothing further, Mr. Chairman.

Mr. SENSENBRENNER. The gentleman from Florida, Dr. Weldon.

Mr. WELDON of Florida. I thank the Chairman.

One of the things, Mr. Littles, that I noted in one of my trips to the Kennedy Space Center was there was some confusion on the part of the personnel there between the concept of a single prime contractor and the concept of privatization.

We had many both civil service and contractor employees coming to us expressing some very strong concern about what is impending with what you are doing in the single prime contractor, and they thought it was commercialization.

My question to you is: Are you making any attempt to educate the staff both on the civil service side and on the contractor side as to what is really going on here?

Mr. LITTLES. We are certainly doing that. I have seen that confusion myself in many, many, many places. There are some who perceived when we started this, and hopefully the word is getting out, that what we were doing was basically taking the Shuttle and turning it over to a contractor and he was going to go do this job without us.

That is far from being the case.

We are attempting by every means possible to get that message down to the people through the system.

Mr. WELDON of Florida. One of the issues I have been concerned about throughout this process has been the issue of morale and the impact of this transition on morale. My question is: Is this something that you are looking into? Is there a relationship between employee morale, particularly, and employee performance and safety? Have you looked into that? Do you have plans for looking into that? Do you have indicators that you will be tracking during this process to make sure that morale is not being seriously jeopardized and that jeopardizing of morale is not affecting safety?

Mr. LITTLES. Well, certainly the morale of our work force, both our civil service work force and the contractor work force, is of paramount importance to us.

We understand that when we are going through a change like we are that there are going to be questions and there are going to be concerns.

We are trying to keep the people fully informed. As I indicated earlier, we do have metrics where we track the quality of the work that is going on.

People on the management side are talking to the people to keep them aware of the process as we are going along. But we certainly understand that there are some impacts there.

We hope to take as many of the reductions that are going to go on on the government side with time through attrition. We are also looking for opportunities for reassignment when there are some places where we are decreasing in strength and others might need it, and that is not just within centers; it is across centers.

So we understand that concern, and we are attempting to communicate with the people and to keep them informed.

Mr. WELDON of Florida. You let into another question I wanted to ask. That is, you have given us some personnel numbers in this in terms of reductions. What right now is the attrition rate? And how does that compare to these personnel reductions that you are talking about?

Obviously what I am leading into is what is the discrepancy between the natural attrition rate both in the contractor and the civil service and what your potential personnel targets are?

Mr. LITTLES. I do not have data with me on an attrition rate. I will certainly get that and supply it for the record.

[The following information was received for the record:]

Material requested for the record on page 64, line 1478, by Cong. Weldon during the November 9, 1995, hearing.

Attrition Rates for Office of Space Flight Centers

Center	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
MSFC	4.9%	3.4%	2.5%	10.3%	7.6%
SSC	7.3%	3.2%	7.9%	7.0%	8.8%
JSC	5.4%	3.1%	3.9%	8.5%	6.3%
SSPO					3.7%
KSC	4.5%	3.4%	3.9%	9.0%	9.3%

Mr. LITTLES. There is a point I meant to make, and did not. The numbers that were on the chart that is there that show the civil service workforce reductions, those reductions are the initial estimates in sum of all three centers.

That work is not complete, so those numbers could go up a little bit yet. But the point I wanted to make is that these numbers that you see here are reductions in the Shuttle program.

Now there have been some numbers—as a matter of fact, in the press conference after the zero-based review—the Administrator gave some number for total civil service reductions at Centers. Those reductions do not all come from Shuttle.

These are the numbers from Shuttle. There are other areas of operations work and other things that are also being reduced. So I wanted to make that point, as well.

Mr. WELDON of Florida. I see my time has just about expired, so I will close.

Mr. SENSENBRENNER. The gentleman from Texas, Mr. Hall, the Ranking Minority Member, has arrived. Do you have any questions?

Mr. HALL. Mr. Chairman, I will be very brief.

I would say that I remember a time when a fellow named Lyndon Johnson got elected President, and one of my best friends was selected to be his Chief of Staff. I wrote him a letter and said. When I hear that a friend of mine has been elected or nominated to a high position, I am always proud for my friend and apprehensive for my country.

[Laughter.]

Mr. HALL. I kind of have that same feeling when Dan Goldin is going to save a lot of money, but he says he is going to do it with noncompetitive contracts. It gives me a lot of concern.

And of course the answer to that will be how you all are treated, and how much of a sacred oath you take to really representing this country rather than—as you have always in my connection with you, or my observance—that this certainly puts you in a position to do some really great things for the program and for this country, and also puts you in a position to be the architect of a callosal flop, and we cannot afford another setback in NASA.

Mr. LITTLES. Yes, sir. We appreciate that.

Mr. HALL. So I guess we just——

[Pager sounds.]

That may be Lyndon calling me right now.

[Laughter.]

Mr. HALL. He never likes me to comment on him.

[Laughter.]

Mr. HALL. But I thank you for your testimony, and I will read it, and I am sure my staff has. I look forward to having an opportunity to visit with you and others on this very major change in the system, to me. It's not really, because contractors and NASA have been living next door to one another for a long, long time.

That is the first thing I noticed when I took over the job that the very capable Mr. Sensenbrenner has now. I visited all three of the entities, and I saw a closeness there, and that gave me some concern. But I was told that they had tried it the other way back some

years earlier and it had worked to where we got better results for less money by having a closeness with the contractors.

It is just something that you have to watch very closely, and we will want to be hearing from you from time to time, and thank you.

Thank you, Mr. Chairman.

Mr. SENSENBRENNER. I thank the gentleman from Texas.

Let me say that the history books record that Lyndon Johnson was a hands-on President, but we did not think it extended quite this far.

[Laughter.]

Mr. SENSENBRENNER. The gentleman from Indiana, Mr. Roemer.

Mr. ROEMER. Thank you, Mr. Chairman.

I want to follow up on what the distinguished gentleman from Texas was asking about—not Lyndon Johnson but on safety, and that in the Shuttle program in this country we cannot afford any further problems with safety for the future success of NASA.

You said, Dr. Littles, that we have metrics where we can track safety now. So we can quantify it to a degree.

I want to make both a statement, and maybe not pose it in the form of a question that you have to answer right now, but I would hope when we look at safety and cutting costs and meeting performance, and we put these three things in the contract with this new alliance, that we certainly signal in the strongest of terms that safety is the highest requirement; and that corners are not going to be cut on these other two areas in order to make a profit and potentially shave costs and take risks in this Shuttle program where we are seeing $2 billion cut from the program, and 15,000 employees cut from the program.

Do you have a comment on that before I get to the next question?

Mr. LITTLES. You will absolutely see it reflected in the request for proposal that we give to the contractor. You will see it reflected in the contract that we sign. You will see it reflected in the way we manage this program.

Mr. ROEMER. Finally, my last question would be. In terms of the risk, and the liability, and the accountability that will be in this contract, let's say the scenario repeats itself at the latest Shuttle mission where it is delayed four, or five, or six times.

How is the contract written so as to, with accountability in mind, that the private contractor does not pass on all the costs to the government at that point?

Who will assume the cost for that kind of a delay?

Mr. LITTLES. If there are delays that impact cost, those delays are the responsibility of the contractor. That will be taken into account——

Mr. ROEMER. What if it is a bird that is in fact a woodpecker pecking a hole——

Mr. LITTLES. If it is a bird, I cannot assess that to the contractor. But if it is the contractor's responsibility that causes a delay, we take that into account in the performance evaluation and the fee we give to the contractor. That is a part of our evaluation.

Mr. ROEMER. So that you will make sure that through the awards and the incentives in this contract that we will not have the taxpayer assume many of these costs?

Mr. LITTLES. We will take maximum advantage of our fee structure to ensure that those things that are caused by the contractor that cause costs, or whatever—schedule slips, risk—that we take those things into account in the performance evaluation. Yes, we will do that.

Mr. ROEMER. Thank you, Dr. Littles.

Mr. SENSENBRENNER. Finally, the gentleman from California, Mr. Rohrabacher.

Mr. ROHRABACHER. Dr. Littles, was that figure right? 15,000 people are going to be reduced? The program will be reduced by 15,000 people?

Mr. LITTLES. The reduction between 1996 and 2000 is on the bottom line up there and I cannot read it from here, but I think it is about 7,400 on the far right bottom corner. That is the additional number of people that we assess at this point in time will be reduced from the program between now and the year 2000.

Mr. ROEMER. Would the gentleman yield?

Mr. ROHRABACHER. I certainly will.

Mr. ROEMER. My figures were from 1990, according to NASA figures, to the year 2000. There were about 35,000 employees, contractors, and civil servants that will be reduced——

Mr. ROHRABACHER. Dealing with the Shuttle?

Mr. ROEMER. So that is about a 15,000 reduction.

Mr. ROHRABACHER. Okay. Over the years I have just heard people talk about how NASA as a matter of course will load unnecessary employees onto a program just to have a home for them.

How many of these employees that are being reduced were people that were not necessary to begin with but were directed there as a place to roost?

Mr. LITTLES. I hope, none. I am not aware of a practice of deliberately doing that, but what I will tell you is that when you go and look, as we have done—and I mentioned earlier some examples of where I had done that personally—when you go look at the details of the work, you will find not necessarily that there are people there to roost, but there may be work going on that you do not need to do any more.

We found some of that, and to a significant extent that has enabled us to do the reductions that we have done.

Mr. ROHRABACHER. Well, I hope that is the case. I certainly—anyway, I have just heard these stories time and again with people talking about, well, we had to have some place to put him, and if we take him off of there, then where are we going to put him, et cetera, et cetera.

Let me ask you this. In looking at some of your Space Shuttle workforce reductions by centers, it seems here that between 1992 and 1995 that the Johnson Space Center will lose 105 jobs in terms of the Shuttle, involved with the Shuttle, but the Kennedy Space Center will lose almost 400 jobs.

Is that not sort of——

Mr. LITTLES. I'm sorry? What are you looking at?

Mr. ROHRABACHER. I am looking at your Attachment No. 2, Space Shuttle Program Workforce Reductions by Center, 1992-1995.

Mr. LITTLES. What you are looking at there is a history of what has happened up to now. Those are actual numbers.

Mr. ROHRABACHER. I guess what I am saying is, it seems to me we are taking people off the line. When you talk about safety, it seems to me line people are pretty important. Maybe I am not an expert on this, but taking people off the line at the Kennedy Center and then actually only have one-fourth that number taken off their job at the Headquarters.

Mr. WELDON of Florida. Would the gentleman yield?

Mr. ROHRABACHER. Yes, I would be happy to yield.

Mr. WELDON of Florida. In conjunction with that question, if you could just elaborate a little bit on what some of those Shuttle personnel do at Johnson Space Center?

I understand what they do at Kennedy Space Center, but there is a sizeable number of personnel assigned to the Shuttle in Houston, and if you could just elaborate on what they do?

Mr. LITTLES. I can give you a breakdown of that for the record, and I would like to do that, but they are involved in several things.

The project office for the Orbiter is at Johnson Space Center. So there are a number of people in the project office there.

There are people in the Engineering Directorate who are directly involved with the Orbiter.

There are a number of performance upgrades that are going on, design changes, and they are managing that there and have engineering work force on that.

The Mission Operation Directorate there is responsible for flight planning and flight operations. That is where the flight controllers are. There are a significant number of people involved in that.

They are also responsible for—the astronauts are there. The flight surgeons are there. There are a significant number of categories of work there, and I will give you a breakout of those.

[The following information was received for the record:]

JSC SHUTTLE CIVIL SERVICE WORKFORCE

Civil Service positions which will be retained at JSC after restructuring are:
Shuttle business management
Shuttle program management
Shuttle engineering
Shuttle S&MA
Astronaut Corps
Flight Surgeons
Select Flight Control positions
EVA planning

Mr. ROHRABACHER. It was just that it seemed to me that we are talking, you know, with any business you have got, the Headquarters staff; then you have got the on-line staff. It would seem to me that we were—just the figures between 1992 and 1995, that there seemed to be about four times as many people being let go at the on-line jobs as there are in the headquarters jobs.

Mr. LITTLES. I would have to go back and look at what actually happened to drive those things down, but let me give you a feel for it. There is always an issue and a concern of the balance between centers.

To this point in time, that 1347 up there is roughly equally split between the centers. So there are about 442 at JSC. I think the

number at KSC is 490. Then the number at Marshal is somewhere around 450.

Now in addition to that, of course there are contractors at the centers who are going to be reduced, and we will not know all of that until we get the details of this work.

If you look across the zero-base-review at the reductions across centers—and this includes not just Shuttle but all the activities, what you see is that the reduction in contractor work force at the Johnson Space Center is twice what it is going to be at the Kennedy Space Center.

Kennedy is going to reduce by about 2000 over that period of time, and the number of contractors who will be reduced for all activities of work, not just Shuttle, is about 4000 at JSC.

So there is a significant workforce that is going to be reduced across the board at the Johnson Space Center.

Mr. ROHRABACHER. Thank you, very much.

Mr. SENSENBRENNER. The gentleman's time has expired.

This concludes the hearing. Let me thank you, Dr. Littles, for extremely detailed testimony that I think answers the questions of the Subcommittee, and assure you that we will not be inviting you back for a third try like we invited you back here today.

I think I speak in behalf of all of the Members of the Subcommittee, as well as the leadership of the Full Committee on a bipartisan basis, that we are extremely concerned about the noncompetitive contract that was announced by Administrator Goldin on Tuesday.

This subcommittee will be delving into that question in the days and weeks ahead.

The whole thrust of this Congress has been to increase competition, whether it is in the area of telecommunications or procurement by other departments and agencies in the belief that it is competition that keeps the price down, and noncompetition does not do that.

So I think that you can go back and tell Mr. Goldin that we are all skeptics on whether this noncompetitive contract will actually save the taxpayers money and provide the types of assurances—particularly in the area of safety—that all of us want to make sure that the Space Shuttle is operational.

So you will be getting an invitation to come up here sometime in the future. Just be forewarned that we expect a very detailed testimony.

And we would like to invite your boss to come and give that, rather than have you come.

So with that, I would also like to ask that the responses to the written questions by Members of the subcommittee be submitted by the first of December so we can get this hearing record off to the Government Printing Office.

If there are extenuating circumstances, please let us know, but I have asked some questions, and Mr. Roemer has asked some questions, and Dr. Weldon has asked some questions, and we would like to have a complete response to those, not only those that were asked at this hearing but at the previous hearing on the subject.

So if there is no further business before the Committee, the subcommittee is adjourned.

[Whereupon, at 11:56 a.m., November 9, 1995, the hearing was adjourned.]

[The following material was received for the record:]

Responses to written questions submitted by Cong. Weldon resulting from the November 9, 1995, hearing.

1. NASA has not yet had an independent assessment performed on the safety risks associated with backing out of day-to-day Quality, Safety, Engineering and Operations activities. Why not?

Answer: At the time of the Aerospace Safety Advisory Panel's (ASAP) annual report presentation to NASA (March 1995), the Administrator asked that they provide an independent assessment of the Shuttle program's restructure activities. The ASAP is an esteemed group of operations, safety, quality, and management experts, independent of NASA, who are authorized by law (NASA Authorization Act of 1968, Public Law 90-67, 42 U.S.C. 2477) to do such reviews for the Administrator. In their 1995 annual report, they stated that among other things, they "monitored Space Shuttle processing at the Kennedy Space Center (KSC) and will continue to follow it as personnel reductions are implemented."

In order to place increased emphasis on the changes due to restructure, they have stepped up their visits, reviews, and interim reporting. The most recent informal report by the sub-panel looking at near-term Shuttle activities was at Headquarters on November 29, 1995. In mid-December, we will provide a special briefing for them on the safety aspects of the acquisition plan, and in early 1996, they will review our workforce roles and transition plans.

In addition, we have invited the Inspector General's office to participate in the restructure acquisition process as it happens, rather than by their more traditional after-the-fact audits. Finally, the Office of Safety and Mission Assurance (S&MA), which is NASA's independent safety "watch-dog" organization, has been working side-by-side with the Office of Space Flight in the restructure effort. They will be instrumental in developing realistic, safe transition planning.

2. In some areas to be transferred to the Prime, NASA has higher capability and/or competency than the current contractor(s). How will NASA insure the capability gaps are eliminated before the contractor takes full responsibility.

Answer: NASA plans include a transition or "training wheels" period which will allow for careful and measured transition of knowledge and capability to the contractor. The nature of this activity will depend upon the degree of complexity and criticality of the tasks. In many cases, the tasks will be familiar to the contractors, but in some the transition may

take some time to accomplish. For each task, NASA is developing metrics to be used during the transition to measure contractor capability. We will take the time to do it right. You should note that some of these civil service to contractor task transitions are already under way as part of ongoing restructure activities recommended by the Functional Workforce Review, Safety and Mission Assurance initiatives, as well as other continuous improvement changes.

3. As part of the restructuring activities, the written testimony makes several references to "the top-down requirements review." Who is the NASA manager responsible for that top-down requirements scrub?

Answer: The top-down requirements review mentioned in the testimony was initiated last spring as part of the overall program restructure. A bottoms-up requirements review was requested as part of this same activity. The Associate Administrator, Office of Space Flight (OSF), tasked the Program Manager (whose title at that time was Director, Space Shuttle Operations) to do the top-down review. The Director tasked his Deputy for Systems Integration, Mr. Lawrence Williams, to lead the effort. The Associate Administrator tasked the Director, KSC to do the complementary bottoms-up requirements review. He selected Mr. Robert Sieck, the Director of Shuttle Operations at KSC at lead the effort. At this time the top-down requirements review is complete, and its recommendations have all been submitted to the Program Requirements Change Board process for programmatic review and eventual implementation as appropriate. The bottoms-up requirements scrub results are currently under review at KSC, and where appropriate, by the Program Requirements Change Board process (i.e., some of the recommendations were programmatic versus project level in nature).

3a. Please describe the process used in the top-down review.
Answer: Mr. Williams selected a small team to evaluate the guiding programmatic policies and principles that flow down to the projects as requirements. Each organization in the Shuttle program was represented on the team. The team met twice a week for several months to look at the requirements in light of 15 years of flight experience with its attendant systems and operational maturity. They looked at the following key areas:
(1) Failure Modes and Effects Analysis/Critical Items List
(2) Master Verification Plan (the driver of much of the Shuttle hardware checkout at KSC)
(3) Flight Rules
(4) Launch Commit Criteria
(5) Configuration Change Process
(6) Definition for all Program Elements of in-and out-of-family

(7) Program Element Functions (Volume XI of the Program Requirements Document)
(8) Program Requirements and Change
Mr. Williams and his team developed a set of recommendations which were then forwarded to the project managers and S&MA officials for evaluation. In some cases, team recommendations were not accepted based on reasonable concerns by the project level personnel about safety, schedule, or cost implications of the suggested changes. An example was a recommendation that we stop treating in-flight anomalies with higher priority than ground anomalies. This requirements review was accomplished using the same formal process for debate and implementation as were all previous Shuttle program requirements "scrubs." The major difference here was that this one was the most rigorous, comprehensive look at program requirements since the post-Challenger days.

3b. Presumably by reducing requirements NASA can eliminate tasks and, therefore, eliminate people; is that correct?

Answer: One of the most important outcomes of the requirements reduction is the elimination of unnecessary tasks. An obvious result of this outcome is reduction of people, and thus cost, from the program.

3c. If requirements are reduced to the point that we have an accident as a result of a missed requirement or improper troubleshooting of a system problem, who assumes responsibility?

Answer: The Program Requirements Change Board (PRCB) is an extremely thorough, highly visible, sometimes even painstakingly comprehensive process designed to ensure that all of the right people in the program (government and contractor, line and assurance organizations, operators and engineers) look at and debate, in public forum any and all aspects of significant program changes. All of the top-down requirements review recommendations were submitted to the PRCB after rigorous team reviews. If the Board were to approve a program change which later resulted directly in a major Shuttle mishap, assuming no fraud or other misrepresentation were part of the PRCB process, the responsibility would be that of the Program Manager, as Chairman of the PRCB. However, it should be noted that in a program like Shuttle, as in any operational program, the nature of program management is risk management. The only way to assure zero risk is to stop flying. Any flying operation has, and accepts, a small but finite level of loss probability, and the Program Manager uses the best process NASA knows to help him make the right trades and risk management decision.

Your question poses a second hypothetical case where improper troubleshooting of a system problem is the primary cause of a mishap. The responsibility for the error would depend on the situation. If the procedure is correctly written, but improperly executed, the responsibility could rest with the individual if proper diligence was not exercised on the job. On the other hand, if the training system improperly prepared the employee for the job, or if poor supervision was a contributing factor, these things would have to be considered in the assessment of cause.

4. The written testimony states that, "the NASA program manager is developing the Program Management Plan which outlines the relationships between government and contractor, program, and Safety and Mission Assurance organizations, program and center support organizations, and Shuttle and Space Station programs." Then it goes on to list ten items: (1) Government/contractor roles, (2) contract management (including performance evaluation process), (3) requirements management, (4) technical board structure, (5) matrix support from the centers, (6) certificate of flight readiness, (7) program integration, (8) development versus operations management, (9) strategic planning, (10) Government organizational structure.

This list covers virtually every aspect of the program. With such a low level of maturity in the transition planning, NASA employees have been unable to assess and contribute to the management of the transition planning. Is this by design? What guidelines has NASA Headquarters issued to managers at NASA centers to assist them in transition planning?

Answer: Since the early months of 1995, the program has been developing the guidelines, strategy, and plans for the restructure. All of the Shuttle projects and supporting organizations have had inputs into the planning. NASA managers, as well as key experienced NASA employees from all four OSF centers have been involved in various aspects of the restructure activities. An all-encompassing program restructure such as this one must be done with many activities proceeding in parallel in order to avoid unacceptable delays in implementation. So, while the Program Management Plan is being developed, at the same time, the acquisition planning is fully engaged, the S&MA restructure is proceeding, and the task-by-task assessments of civil service functions is taking shape. The Program and Headquarters management continually review status and compare progress of the iterative process to ensure that all elements of the restructure are heading in the same direction. There has never been, nor can there reasonably be, a plan to either prohibit inputs from employees, nor to include all 3000 Shuttle civil servants on the teams. We have encouraged open communications and in view of the expected

downsizing of the Shuttle workforce, it is not a surprise that many long time valued employees would like to participate more.

We feel strongly that the most important route for employee ideas is through their line management, as well as through the S&MA community (for safety concerns). We trust our Center and project managers to properly represent legitimate employee concerns to the process.

COMMENTS:
The following provides concise responses to the 40 questions/comments raised to your staff in reference to the draft testimony used by the Associate Administrator to prepare for the formal testimony on November 9. It is unprecedented to enter a preliminary draft into the official record, but we will try to point out where a difference between the draft and the formal submittal may exist. The draft is not a part of our official record and is not acknowledged by NASA as a part of our testimony.
In answering the comments and questions, the Committee should be aware that we consider these questions to be entirely appropriate for our own Center and project managers to address with the employees. You could help our process by encouraging NASA employees with whom you correspond to be sure to talk to their supervisors and to their S&MA representatives who are intimately involved in this restructure in order to get more timely responses to their questions.

1. KSC was not solicited for input, but directed instead. Reference the KSC bottoms-up program review, 2500 suggestions submitted by the entire workforce are still being assessed.

Answer: During all phases of the restructure planning, all four OSF Centers have been solicited for input. As a part of the OSF Management Council, the Center Directors had, and continue to have, the opportunity to help the Associate Administrator develop guidelines and top-level policy. The many program and team level reviews allow every project and every Center to participate in the implementation planning.

The referenced KSC bottoms-up program review was specifically tasked by the Associate Administrator early in the year, and it is an excellent example of how highly the program values the KSC input.

2. The intent is to pattern Shuttle operations after the Marshall management approach. MSFC design center failures using this approach without overall NASA insight/oversight resulted in launch delays or fleet grounding. For example, RSRM nozzle backfill problems, SSME manufacturing flaws, Super Lightweight Tank behind schedule and over budget.

Debris in an External Tank fuel line was detected by a KSC mandated inspection, which has been singled out for deletion by the Contractor. The presence of debris in this system could have led to catastrophic engine failure. The MSFC approach would have permitted the deletion of this crucial inspection.

Answer: There are examples of failures to go along with the successes at each of the Centers. For example, on a recent flight, critical washers were not installed at KSC and not discovered until after the flight. On another recent flight a launch was delayed due to a procedural error with a hydraulic system. There have been several other critical escapes at KSC in recent months. All Centers must strive to improve the audit and surveillance of contractor activities to avoid such occurrences. This has no real bearing on the changes being made and the processes designed to detect such occurrences will, in fact, be strengthened.

3. Martin Marietta had operated with excess personnel for many years with MSFC "insight." This was standard operating procedure for the MSFC government "hands-off" style.

Answer: The purpose of this part of the written testimony was to show that we have recently done task-by-task reviews of all projects. In the early 90's, there were many areas in the program where the lack of such reviews in the post-Challenger timeframe resulted in unnecessary work being perpetuated. The Martin example is one where obsolete NASA requirements, not necessarily the number of NASA overseers, drove costs unnecessarily high. It highlighted the need for our government managers to continually question what we task our contractors to do.

4. The assumptions for this conclusion were taken out of context. The original report should be viewed in its entirety. The report did not recommend significant reductions in the KSC civil servant workforce. Only 10 percent was proposed instead of the 50 percent recommended by Dr. Littles.

Answer: The Functional Workforce Review began before the restructure guidelines were developed. It assumed a program structured as it is today, with many prime contracts and government project offices. It asked its teams to look for redundant tasks, unnecessary work, and overlapping functions which could be consolidated. The Workforce Review did not anticipate the later NASA emphasis on reducing the roles of civil service across the Agency, or of going to a single prime contractor for Shuttle. Also, the 50 percent reduction in civil servants mentioned in the question first came from the Program, not from the Associate Administrator. In

response to the Kraft report, and to the March guidelines by the Associate Administrator, both of which called for reduction in the roles of civil servants, the Program made a first cut estimate of civil service reduction. The Program Manager, with the advice and input of the projects at the Centers briefed the Associate Administrator and Center Directors on a potential 50 to 70 percent reduction in civil service by the year 2000. This was not direction, but a goal to be used as a starting estimate. The projects at the Centers were expected to determine and are currently in the process of determining the final answers. To date, MSFC projects are approximately 70 percent, JSC approximately 30 percent, and KSC still about 50 percent civil service reduction. We depend on each Center to carefully assess its needs with respect to the March guidelines, and we expect to have a task-by-task review in January with Office of Space Flight management before we accept the next iteration of civil service projections. Then, as the prime contract negotiations proceed and the implementation plans take shape, we expect even more iterations as this major task takes shape.

5. With all of these new modifications coming through the system, how can the Shuttle be considered "operational?" Referencing the extensive Rockwell Change List will show the Shuttle design is anything but "frozen." The Shuttle is considered to be an R&D vehicle still.

Answer: A new aerospace system's progression from experimental/ developmental to fully operational is a continuum. The Space Shuttle was declared "operational" by the President after its fourth flight in 1982. Clearly, that was premature; but after 15 years of flight and over 70 missions, the operational aspects of the program are significantly more mature than any previous NASA human space flight program. The referenced part of the testimony lists ongoing developments, some of which will not be introduced into the fleet until late 1997. However, it should be noted that the strategic planning for Shuttle calls for no major additional upgrades until after FY 2000, when a decision will be made to either phase out the system or upgrade it for long-term use. The decision will be based on the progress and scope of the RLV program. Meanwhile, there is much about the operational aspects of the program that is relatively mature, and does not need the intense government oversight it once required.

6. Why is the budget considered first? Is the budget the real driver of the Program changes?

Answer: Naturally budget pressures have been a driver in United States Government, not just NASA strategy. Early in 1995, the President announced that as part of a major cost cutting initiative, we are to reduce

civil service across the government by 250,000 people over the next several years. These cuts have already begun. NASA is not exempt; and in May of this year the Administrator, in the May Zero Base Review press conference, reiterated his strategy of meeting severe budget challenges with infrastructure reductions (including government jobs) rather than program cuts to preserve the critical balance of NASA's program objectives. The NASA of the future will have its civil servants focusing less on routine operations which can be done effectively by contractor, and more on cutting-edge research and technology development. However, in changing the Shuttle program, safety is considered first and is the overriding priority.

7. "Who" exactly committed the Shuttle program to a 16.5 billion dollar budget?

Answer: The Program Manager, with the advice and consent of his project managers at the Centers, committed the Program to the $16.5 billion budget.

8. The Zero Base Review plan which eliminated "unresolved" budget issues was already determined by the overall budget, not by studying work content.

Answer : This statement is not true. The Shuttle Functional Workforce Review, followed by an extensive program commitment exercise went into great detail outlining program efficiencies. In many cases, reductions were at the individual task and single worker level. It was an intense review conducted by experienced NASA engineers, operations experts, and managers. These inputs were a major input into the Zero Base Review.

9. "Who" exactly requested an additional 5 billion dollar reduction? Congress? President? NASA?

Answer: The President requested a $5 billion reduction in NASA's five year budget as part of his tax cut strategy in early 1995.

10. . Only "pieces" of results from the original reports have been included. Many of the parts have been taken out of context. The actual entire reports should be reviewed to see the original intent.

Answer: See the answer to comment 8.

11. There are many ways to reduce costs without major reductions in the work force. For example, the Bottoms-Up Review listed 2500 suggestions

contributed by the work force, who have some of the best insight for these proposals.

Answer: Unfortunately, we cannot agree with the comment. The only way to significantly reduce the budget is by eliminating tasks, thus jobs. The great majority of the Shuttle budget goes directly to workforce. Even the part of the budget that goes to "hardware", is actually spent on subcontractor and vendor workforce. Only a small percentage of the funds purchase consumable such as hydrogen, oxygen, helium, crew food, etc. It should be noted that most of the 2500 suggestions contributed by the KSC workforce deal with concepts that reduce work and thereby workforce.

12. The Requirements Review will not be completed until June l996. The Review causes much of the work to be done in the OMDP every 3 years or 8 flights instead of every flow. Since one Orbiter will be in OMDP at any given time, downsizing is not possible.

Answer: This comment is untrue.

13. The Shuttle design should not be frozen. A vehicle flying for 20 or 30 years should be updated with new technology. The existing fleet can even be used as a limited test bed rather than expensive and complex alternatives. However, knowledge gained at the processing/launch center is not included in considerations at the design center.

Answer: If, as explained in answer #5, the NASA decision in FY 2000 is to fly Shuttle for many more years, we will "unfreeze" the design, and will upgrade the Shuttle to take on its new or extended mission as required. We are working closely with the RLV program management team to look for ways of using the Shuttle vehicle and infrastructure as a test bed for future technologies. Examples are the planned use of the Shuttle Carrier Aircraft for the initial developmental stages of the X-34 program, and the use of the Shuttle orbiter as a high speed test bed for advanced thermal protection and avionics systems. Also, Kennedy Space Center experts have contributed greatly to the ground launch part of the advanced transportation system studies.

14. KSC disagrees with these findings. Look at the team member backgrounds and contractor affiliations. The vehicle is not operational and will always be changing.
Answer: We take this comment to mean that the individual who wrote the comments disagrees with the Kraft report findings. None of our information shows the Kennedy Space Center as disagreeing with the findings. It should be pointed out that of the eleven members of Mr.

Kraft's technical Advisory and Support Staff there were three members of KSC senior management, including today's Center Director and Director of Shuttle Management and Operations. Also on that staff was a former Deputy Center Director and Shuttle Operations Director of KSC. KSC management is a part of the Associate Administrator's team (Management Council) which is guiding the overall program restructure.

15. How does this plan save money from the current program? Show how much is actually saved? KSC believes a new contractor under a new contract will cost more (the Prime Contractor and Subcontractors are allowed profit margins. The government has no profit margin). Can the operating costs for the two programs be directly compared?

Answer: Most of the cost savings expected from restructure of the program come from the third goal listed. - "reduce operations costs". Reducing requirements, incorporating efficiencies (i.e. Functional Workforce Review and 2500 workforce ideas), and cutting down on changes are expected to play major roles. The added step of reducing civil service oversight will allow direct savings in the Research and Program Management Budget (government salaries and travel), and will allow the prime contractor, versus NASA, to manage as subcontractors and/or inherited work that which is today center managed. This will allow the prime contractor the latitude to consolidate work and organizations in ways the government may not have been able to in the past. Clearly, the prime contractor will, in some areas, have to bring on extra people to do important tasks once done by civil servants, but we expect there will still be overall savings.

With respect to profit margins, the intent in our acquisition planning is a contract approach that does not cause the government to pay duplicative fee for the same work. The new subcontractors will be responsible to the prime contractor, and they will receive their fee from the prime contractor as their performance dictates. The government program office will manage the prime contractor, and will observe the performance of the subcontractors as part of the award fee process for the prime contractor. The contract fee structure will also be established consistent with the program priorities:

1) Fly Safely;
2) Meet the Manifest; and
3) Reduce costs ... in that order.

16. Who considers the operation of a complex "Space Ship" routine? KSC can generate a list of over approximately 150 "first time" anomaly occurrences in I995 fourteen years after the program started.

Answer: "Routine" can only be used as a relative term. Most relevant measures of program maturity and operational stability show a significant improvement over the early days when everything was new. 150 "first time" anomalies is a term used by the writer presumably to characterize problems, mishaps, errors, in-flight-anomalies, etc. It sounds like a high number, but is no doubt much less in number and/or significance than it was in the early 80s, or even the early 90s in some cases.

There will always be new things coming up in any operational program, but at this point in the Shuttle's life, it is reasonable, and in fact mandatory that we look at how to manage a leaner, less development-like operation. The government will continue to have insight and understanding of such anomalies.

17. The contractor is not Responsible and Accountable. The government will still have legal and financial liability for the entire program. Or will taxpayers pay the bill once again?

Answer: This comment refers to one of the March guidelines which states that the government will hand over to the contractors certain tasks that can and should be contractor responsibility. Examples are: routine hands-on processing, testing, and maintenance tasks; business management of multiple contracts; S&MA inspections; etc. The terms responsibility and accountability apply to those things we give the contractor to do. The government will be responsible for the overall program, but where today's operational project contractor is responsible directly to a NASA project manager for its performance, after transition it will be responsible instead to the prime contractor. The prime contractor, not the NASA project managers, will be responsible to the NASA Program Manager for the work of all of their new subcontractors.

18. Insight from where? JSC and MSFC, or KSC? Not to be confused with quality audits of work already accomplished. SRQ&A audits at KSC do not provide technical insight or oversight. Under this plan, the Prime Contractor will determine what is "in-family" and what are "out-of-family" anomalies.

Answer: The Program Manager will depend heavily on the Space Flight Centers to provide insight into the activities of the contractor. The centers will no longer manage those contractors as projects, but they will maintain sufficient technical talent to perform joint S&MA/Engineering process audits, surveillance, and independent assessments of technical "out of family" and/or programmatic issues on behalf of the program manager. As part of the transition, and then long-term as part of its process audit plan, NASA will ensure that the contractors have the proper procedures

and guidelines in effect to determine what is "out of family," and this will be audited, as well. Also, as mentioned in the answer to question 15, the program contract with the prime contractor will include a fee determination scheme that puts safety over schedule, and schedule over cost savings in that priority. There will also be reasonable penalties for gross negligence including termination for cause if appropriate. In other words, it will be very clear to all parties that it will be in no one's interest to cut safety corners in the interest of profit.

19. Although no contract has been awarded yet, an uncontrolled and unorganized transition is already happening. NASA is relinquishing important oversight tasks. Personnel, with associated launch processing expertise, are leaving NASA now and finding employment elsewhere. There may be a significant lack of government expertise to train/certify the contractor after contract award.

Answer: We are working with our Center managers to ensure a controlled and organized transition. It is true, as explained in our answer to number four of your first set of questions, that we are transitioning some tasks today based on assessments and previous studies. Obviously, NASA cannot prevent an employee from leaving the Agency. As always, we must continue to plan for losses and try to avoid single point failures in our workforce.

20. Established by whom? The Augustine Report (The Report of the Advisory Committee on the Future of the U.S. Space Program - Dec. 1990 - chaired by Norman R. Augustine) listed findings and conclusions in direct contradiction to these "fundamental guidelines". See attached excerpt.

Answer: The Augustine Report was based on several assumptions which do not exist today. One of the more relevant is that NASA would reorganize in a way that would have Space Station and Shuttle managed by different Headquarters organizations. Today they are both managed in the Office of Space Flight. This was done primarily because of the need for both programs to share assets, and to work closely together in the operational planning and execution phases. Indeed, Phase I of the Space Station program is underway with close cooperation between the two program offices.

Another Augustine suggestion was to maintain heavy civil service role in the Shuttle Program, and to avoid privatization of Shuttle. Clearly that goes against the Kraft recommendations. It would be interesting to see what the Augustine team would have said in light of today's government-

wide initiatives to reduce civil service, and in light of the current status of the Shuttle program.

21. NASA civil servants are not redundant to contractor activities, but serve as "team members" where the government expertise complements the contractor in the overall launch process. In addition, the independent non-profit, check-and balance system is crucial.

Answer: The writer refers to the term "redundant" as though it were pejorative. Where a process is so critical and/or immature that both a contractor and a civil servant must back each other up to assure success, then redundancy is a good thing. However, for those many parts of the program where that redundant team approach is no longer required, we must and will transition to a concept which allows the contractor to do the work, and allows the government to move away from the day-to-day supervision, and/or inspection, and/or duplicative work. It can be done effectively and safely if it's done with care.

22. The FTE numbers were not provided by KSC. These reductions were dictated by HQ. The FTE numbers should be increased to match the level of functional and insight work as assessed by the responsible center, KSC.

Answer: This statement is not true. The numbers provided in Attachment 7 came from KSC mangers. It is in response to the Associate Administrator's March guidelines which contained no numbers. As is the case with all centers, we expect KSC to work the issue, to assess the workforce requirements per the guidelines, and to tell us what they need to do the job safely, effectively, and efficiently. We will then evaluate the results and guide adjustments as necessary.

23. If the Shuttle Program is "operational", why set up a cost-plus award fee? It should be a firm, fixed-price contract, performance based. As an added consideration, the prime contract is a five year contract with no options. Therefore, there is minimal incentive to maintain facilities.

Answer: The Shuttle program is operational relative to its early days. It is by no means a risk free operation. At this stage in its life, a cost plus award fee (which will emphasize safety) with an incentive feature is appropriate. It will be performance based, and although we're still working on a length-of-contract proposal, it will probably run until the end of Space Station assembly with two or more options out to a total of 10 years. We do plan to have a "look back" feature in the award fee arrangement wherein the government will assess the overall health of the program every 30 months or so. This is to ensure that the program's

infrastructure is being maintained (i.e. contractor managed facilities still robust, logistics systems still intact, corrosion under control, etc.)

24. Will the contractor really be liable for the entire capital loss or just be subject to a penalty fee? Which would really be a reduction of the award fee?

Answer: The contractor will not be liable for the entire capital cost. Strict penalty features, consistent with regulations will be part of the contract.

25. PRACA was established during the Gemini program, not after the Challenger accident.

Answer: That is true - PRACA existed before the Apollo program, but its data were not generally available to all necessary decision making management. This lack of communication was corrected after the Challenger accident by instituting the Program Compliance and Assurance Status System (PCASS). This made all program data, including PRACA, immediately available at any time across the program so that all decision makers were fully informed.

26. The crew escape pole system cannot be used for all contingency scenarios and is available for only a short time of flight. The crew escape pole cannot be used during powered flight, but only during controlled, gliding flight (reference the NSTS Systems Handbook).

Answer: NASA agrees with this comment. It refers to a section in the testimony that lists major safety initiatives since the Challenger mishap. Although limited in its operational envelope, the escape system is a significant improvement over the old escape system (none).

27. With the exception of KSC practice, all Project level FRR's consist of whatever the contractor wants to tell NASA.

Answer: Unfortunately, this response indicates that the writer has no familiarity with the FRR process outside of KSC. The project level FRR is the forum where the project manager hears from NASA line organizations, as well as the contractors, all issues and status relevant to the flight in question. For Government-Furnished Equipment/Services (GFE), the project manager hears from appropriate civil service line managers. He (she) also hears from the assurance people (usually government S&MA) and from his (her) government engineering staff.

27a. Drastic change to the nature of the FRR process will occur at KSC which, by the way, is where most of the anomalies and problems are

detected (where the hardware is located). Since NASA involvement is integral to the process at KSC, how can the intent be maintained?

Answer: The government will no longer manage element contractor activities. After the transition period, the prime contractor will speak to the Board for all activities performed by its subcontractors. The role of the government managers who today speak for their projects, will be to provide the results of their audits, surveillance, and independent assessments to the FRR Board as a compliment (or disagreement if warranted) to the prime contractor's assessment. These independent government assessments will include assessments of all significant anomalies by the government organization most knowledgeable of the hardware.

28. Scare tactics and the proposed management style from the Administration is driving technical experts away. Many have left already and the extensive expertise/knowledge lost. More are leaving now. Design center expertise has eroded over the years due to the stable Shuttle design. Now the launch processing expertise is being lost at KSC.

Answer: The use of the term "scare tactics" implies that the restructure activities are not real and that, after all is said and done, there will be no reductions in civil service. This is not a drill, and we've told our people this. There will be reductions in workforce, both contractor and civil service, over the next several years. We are sensitive to the concerns of the employees, and we are working with them during the process to maintain open lines of communications.

29. This only occurs at JSC and MSFC. This is not applicable for operations sites. No matrix support organization exists at the operations sites. Control and insight remotely cannot be done.

Answer: All the Centers will be required to provide qualified civil servants for a variety of tasks at their various locations. We expect that a mix of hands-on and insight related activities will be provided by the Centers to the program in a matrix arrangement. While most surveillance and audit functions will be local, many audit and insight activities will be conducted by the most qualified personnel, some from design centers. This mode of operation is not new and has been proven to be very successful in other parts of the program.

30. SRQ&A audits are "after the fact" studies. Work has already been accomplished and the paper closed. SRQ&A personnel do not have the

technical expertise and background to provide insight/input into problem resolution.

Answer The NASA Engineering and Quality Audit process suggested by the testimony uses the combined efforts of both the engineering (operations) and S&MA organizations to conduct thorough process-oriented audits. They look at procedures, training, qualifications, processes, metrics, etc. to establish process health. If the process is stable and in control, it will produce quality results.

31. Ask to see charts on component replacement, first-time occurrences of problems (line replaceable unit charts are provided as an example). Metrics can show whatever outcome is desired.

Answer: As stated earlier (question #16), most meaningful metrics show significant improvement in operational stability and program maturity over past years.

32. Assurance responsibility is not technical responsibility. Only engineering has the expertise and background to perform this function.

Answer: We agree that assurance responsibility does not include engineering. The line organization, contractor and government, is responsible for its products and operations. The S&MA organization's role is that of assurance, or making sure that the line organization is doing things safely with quality and reliability. They do this by observing, surveying, sampling, inspecting, auditing, not by doing...that's the line organization's job. We do not agree with the writer that only engineering has the expertise and background to perform the assurance function.

33. This is not consistent with the recurring theme of handing responsibility to the contractor.

Answer: When NASA says that everybody is responsible for safety, it means that everyone has a part to play in the safety program. The line organization is responsible for safe products and operations. The assurance organizations' roles are explained in the answer to question 32. As we continually remind our people, both government and contractor, everyone has an important role. As our Space Flight Awareness Program continually reminds, it all boils down to sending human beings into space to do good work and bringing them back safely after they've accomplished their mission.

34. Reference Attachment 2, where did all the people go? Look at the individual Center headcount, not just the Shuttle program. JSC and MSFC hid these people in institutional support organizations.

Answer: The allegation that Shuttle civil service workforce percentage is "hidden" is inaccurate.

35. Reference Attachment 3, total KSC losses for FY 94/95 civil servants were 477 FTE. Only 317 took the buyout. That equates to an already considerable loss of expertise due to the management scare tactics.

Answer: See the answer to question 28.

36. Reference Attachment 5, who issued the budget reduction challenge? Who accepted the challenge? Who is responsible for all this?

Answer: The budget reduction challenge represents the Space Shuttle program assessment of reductions which could be made.

36a. Ask to see the Function Workforce Review presentation. Reference the KSC FWR reduction. The number of 1077 is highly suspicious since the FWR did not mandate such significant cuts.

Answer: The Shuttle Program Director has provided you with a briefing on the Functional Workforce Review (FWR). The estimated savings attributed to the FWR on Attachment 5 represents the cumulative five-year effect associated with the reduction of over 3100 contractors across the program from FY 1996 through FY 2000. The FWR provided recommendations to Shuttle program management as ways to become more efficient under the organizational structure as of September 1994. Since that time, the projects have begun to implement those recommendations which are assisting us in meeting budget challenges.

36b. What is "other restructuring?" The 359 number is unusually high as well. May want a detailed breakdown of all these line items on this page.

Answer: "Other restructuring" on this chart refers to additional program restructure savings which we expect to achieve through consolidation and other restructuring activities.

37. Reference Attachment 6. At the time a prime contractor is selected, government workforce reductions begin immediately. There is no transition period.

Answer Government downsizing and transition of work to contractors is occurring as we speak. There are many consolidation and efficiency ideas resulting from the various restructure related reviews (workforce review, requirements reviews, contract consolidations, etc.).

38. Reference Attachment 8, today 1017 FTE; 500 at the end of the transition. Dr. Littles mandated these numbers, then removed them from the presentation sent to you. The chart does not show the drastic reduction already accomplished due to buyouts in the FY 94/95 timeframe.

Answer: No numbers were mandated by Dr. Littles. The data provided in the testimony was to illustrate the process taking place. We included no numbers since the work is incomplete.

39. Reference Attachment 9. The chart is misleading. Types of flight anomalies previously encountered are not documented as In-Flight Anomalies, but do drive KSC work (i.e., troubleshooting, component repair or replacement).

Answer: Attachment 9 was provided not to tell the whole story of the Shuttle program, but to give an example of one measure of program health and stability. Clearly there are many metrics but, as stated before, most meaningful ones tend to substantiate a state of maturity relative to past years.

40. Reference Attachment 10. The chart is misleading. This chart indicates the mishap frequency is decreasing. But actually, "close calls" were included in values to June 1994, then excluded after that point in time to give the appearance of improvement.

Answer: We agree that without explanation the chart in Attachment 10 is misleading, therefore, we did not submit it with our official written testimony.

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